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In the Supreme Court of the United States

OCTOBER TERM, 1982

SENTRY INSURANCE A MUTUAL COMPANY
AND GONZALES MANUFACTURING AND
INDUSTRIAL MACHINE WORKS, INC.
Petitioners

VERSUS

TODD SHIPYARDS CORPORATION, ET AL.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FIFTH CIRCUIT

APPENDIX TO PETITION FOR WRIT OF CERTIORARI VOL. II — APPENDIX C

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SENTRY INSURANCE, A MUTUAL COMPANY SUBSIDIARIES AND AFFILIATES

Sentry Insurance, A Mutual Company, lists the following subsidiaries and affiliates: Sentry Insurance, A Mutual Company, Century Communications, Sentry Reinsurance, Inc., The Sentry Corporation, Sentry Insurance of Michigan, Inc., Sentry Insurance of Illinois, Inc., Mid State Airlines, Inc., Reed Industries, Inc., Leitner Corporation, Magna Systems, Inc., Photon Sources, Inc., Sentry Broadcasting, Inc., Stevens Point Broadcasting Company, Sentry Aviation Services, Inc., Barnhill-Hayes, Inc., SENCO, Inc., Parker Services, Inc., Sentry Life Insurance Company, Sentry Life Insurance Company of New York, Patriot General Life Insurance Company, Parker Stevens Agency, Inc., Parker Stevens Insurance Agency of Massachusetts, SNE Corporation, formerly Vetter Corporation, Sentry Indemnity Company, Middlesex Insurance Company, Patriot General Insurance Company, Harris Chrestline Corporation, Chrestline, Inc., Chrestline International Sales Corporation, Creative Management Alternatives, Inc., Dairyland Insurance Company, Great Southwest Fire Insurance Company, Great Southwest Surplus Lines Insurance Company, Dairyland County Mutual Insurance Company of Texas, Sentry Group Foundation, Inc., Sentry Syndicate, Inc. (NY), Sentry Syndicate/Illinois, Inc., Texas Sentry, Inc., HANSECO, Sentry Equity Services, Inc., Sentry Foundation, Inc., Sentry Services, Inc., Sentry Fund, Inc., Sentry Cash Management Fund, Inc., Sentry Financial Services Corporation,

Sentry Credit Corporation, Sentry Investment Management, Inc., Sentry Reinsurance Management, Inc., Centerpoint Reproductions, Inc., Midway Productions, Inc., Sentry Assurance International Ltd., Sentry Insurance Group U.K. Ltd., City of Westminster Assurance Company Ltd., City of Westminster Assurance Society, Marsham Court Management Company Ltd., Sentry Motor Insurance Company Ltd., Sentry Insurance Services Ltd., Sentry Underwriting Agencies Ltd., Sentry U.K. Insurance Company Ltd., Gaudery Ltd., Great Lumley Farming Company Ltd., Willisham Farming Company Ltd., Dorane Farms Ltd., Astwood Hill Farming Company Ltd., Sentry Insurance Management Ltd., Sentry Finance Ltd., Sentry Securities Ltd., Sentry Association Ltd., Sentry Pension and Life Assurance, IRAN Life Company, Sentry Holding Ltd., Sentry Life Assurance Ltd., Sentry Marketing Party Ltd., Australian Casualty Company Ltd., Sentry Insurance (Australasia) Ltd., Sentry Financial Management Ltd., Sentry Assurance of South Africa Ltd., SNA Holdings Bermuda Ltd., Sentry Assurance Management Ltd. Bermuda, SNA-RE Bermuda Ltd., SNA Holding SAL, Building Society SAL, Saudi Insurance Company Ltd., Societe Nationale D'Assurance, Bank of the Near East, Actuarial Management and Marketing Companies, VADUZ, Jordan Eagle Insurance Company Ltd., Middle East Reinsurance Office, AMC (UK) Ltd., Sentry Holdings (Antilles) N.V., AMC (Morocco) LA MAROCAINE VIA, Sentry Holdings (Asia) Ltd., Sentry Holdings (PTE) Ltd. Singapore, Sentry Capital Ltd., Sentry (HK) Ltd., Sentry Insurance Company Ltd., Maghrebia Society D'Assurances.

APPENDIX "C"

TODD SHIPYARDS CORPORATION,
Plaintiff,

v.

TURBINE SERVICE, INC.,
Gonzales Manufacturing and Industrial Machine Works, Inc., and a Certain Turbine Rotor, Casing, Blades, RIngs, Housing, and All Assorted Parts Thereto, all of which being from the SS KATRIN, Defendants.

Civ. A. Nos. 75-1825, 75-2719.

United States District Court,
E. D. Louisiana

Sept. 1, 1978

Shipyard which had agreed to perform repairs on vessel's turbine brought action against subcontractor and sub-subcontractor demanding return of damaged parts. The subcontractor and sub-subcontractor asserted a lien for money due from the shipyard. Vessel owners intervened. The District Court, Cassibry, J., held that: (1) shipyard, subcontractor, and sub-subcontractor had been negligent and had breached their implied obligations of diligent performance; (2) vessel owners had not been contributorily negligent; (3) red-letter clause limiting shipyard's liability to $300,000 was invalid in the instant case; (4) measure of damages to be awarded to the shipowners was the sum of the cost of repairs to return the turbine to the state it would have been in if the contract had been performed, the necessary expenses during down time of the vessel after

the repairs were performed deficiently, lost profits during that down time, and costs and attorney fees, and (5) shipyard was entitled to indemnity from the subcontractor and the sub-subcontractor.

Order accordingly.

William R. Pitts, Breard Snellings, New Orleans, La., for Siemens A. G., Siemens Capital and Siemens Corp.

James B. Kemp, Jr., Phelps, Dunbar, Marks, Claverie & Sims, New Orleans, La., Richard A. Hagen, Crowell, Rouse & Varian, New York CIty, for Todd Shipyards Corp.

William A. Ransom, III, Chaffe, McCall, Phillips, Toler & Sarpy, New Orleans, La., Donald F. Mooney, New York City, for Auto Transportation.

George V. Baus, Adams & Reese, Michael G. Crow, New Orleans, La., for Turbine Service, Inc.

Fred E. Salley, Jones, Walker, Waechter, Poitevent, Carrere & Denegre, New Orleans, La., for Travelers Ins. Co.

Crawford, Lambert & Goldsmith, John L. Goldsmith, Gonzales, La., Ralph E. Smith, Deutsch, Kerrigan & Stiles, Allen F. Campbell, New Orleans, La., for Gonzales.

Hammett, Leake, Hammett, Hayne & Hulse, John I. Hulse, IV, New Orleans, La., for Sentry Ins. Co.

CASSIBRY, District Judge.

I. *BACKGROUND*

BASIC FACTS

This case involves an attempt by owners of the vessel KATRIN to recover damages due to faulty repairs performed by several repairers. The SS KATRIN was purchased by Auto Transportation, S.A., ("Owners" or "Shipowners") early in 1973 and managed and operated by Diana Shipping Agencies, Inc., a Greek management company ("Diana"). In February of 1975, the vessel entered Todd Shipyards Corporation's ("Todd") repair yard at Algiers, La. for repairs to the bulkheads and boilers as well as an inspection of the vessel's high pressure (HP) and low pressure (LP) turbines. Todd engaged a subcontractor, Turbine Service, Inc. ("Turbine Service") to open up the turbines for inspection. The LP turbine was found to be badly damaged, needing extensive reblading and repair. The HP turbine required relatively minor repairs. Todd obtained a bid from Turbine Services for the required repair of the turbines. Turbine Service, in turn, subcontracted a substantial portion of the work to Gonzales Manufacturing and Industrial Machine Works, Inc. ("Gonzales").

Todd and Turbine Service personnel searched for re-

placement blades for the KATRIN's LP turbine. Finding none that were suitable, Turbine Service procured some blades which had an airfoil profile similar to the airfoils of the KATRIN's LP rotor blades.[1] A decision was made to arc weld more than 400 of these replacement airfoils onto roots of old blades for insertion into the KATRIN's LP turbine rotor. Who decided to do this welding was a primary issue at trial. Because the fabricated blades were shorter than the original KATRIN blades, Gonzales manufactured "spacer rings," annular steel rings, to attach to the inner diameter of the KATRIN's LP turbine casing to take up the gap left between the fabricated blades and the casing. In addition, shrouding strips were manufactured and attached to the rotor blades around the entire circumference of four rows.[2] Shrouding is a steel rim all the way around the ends of the airfoils. The casings, rotor and airfoils may be seen in pictures which are in the record.

The work on the turbines was accomplished during March, April and May of 1975. The turbines were tested during two dock trials without major incident. On Satur-

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[1] An airfoil of a turbine blade is that portion of the blade that protrudes into the steam flow, transforming energy in the steam into mechanical energy to propel the ship. It is distinguished from the "blade root," the bottom portion of the blade which fits into a groove to hold the blade in place.

[2] The KATRIN had two types of LP blades: "rotor blades," fixed on a rotating rotor drum with a geometric pattern similar to the spokes of a bicycle without a rim; and "stationary blades," fixed around the outer circumference of the turbine casing, having a geometric pattern similar to bicycle spokes without a hub. There are several pictures of the LP turbine in the record which clearly show its airfoil configuration. Some of the original airfoils themselves are also in the record.

day, May 24, 1975 the KATRIN underwent a river trial. A Todd observer on board the KATRIN during the river trial reported that the turbines had reached normal operating speed when he heard a "ping" in the LP turbine. Later he heard two more "pings" followed by a rubbing sound. The turbines were stopped and the vessel was returned to Todd by tow. The LP turbine was opened, and considerable damage was found. Owners elected to ship the LP turbine to Siemens A.G. in Germany ("Siemens"), the original manufacturer, for rebuilding.[3] Eight months later the LP turbine was returned to New Orleans and reinstalled by owners' own contractor, outside Todd Shipyards, under the supervision of manufacturer's and owners' representatives. An examination of the HP turbine, which had remained in place in New Orleans, disclosed that the gaps between the tips of the rotor blades and the outer casing of the turbine (known as "clearances") were excessive. Despite this discovery owners decided to let the vessel sail

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[3] All references to Siemens in this opinion are to Siemens A.G., a foreign corporation domiciled and incorporated under the laws of the Federal Republic of Germany. All three repairers and the two insurance companies filed a Third Party Demand against Siemens A.G., Siemens Turbinenwerk (allegedly also a German corporation), and Siemens Corporation, a corporation domiciled and incorporated under the laws of New Jersey. Siemens Turbinenwerk is in fact a factory of Siemens A.G., and once the parties were apprised of this fact it disappeared from subsequent filings except for the final stipulation.

Apparently inadvertently, a fourth Siemens name appeared in the record, that of Siemens Capital Corporation. Although they are sometimes referred to as a third-party defendant in the record, they were never made a third-party defendant to this suit.

On May 1, 1978, a Stipulation was entered into by all parties to the suit that removed all Siemens entities from the suit except for the claim of Siemens A.G. against Todd in the amount of $12,838.01.

out of New Orleans on March 2, 1976.

The vessel traded commercially for the next four months, experiencing excessive temperatures in the condenser top. In July of 1976, passing the Irish coast at Cork, one boiler was closed down while repairs were being made to an evaporator cover, and the vessel maintained a speed of about 45 RPM. The turbines suddenly seized and stopped. The vessel began drifting towards the coast, and the danger was such that preparations were made to abandon ship. The master ordered the chief engineer to try to operate the turbines, no matter what their condition, in order to save the ship and crew. The chief engineer started the turbines and operated them long enough to bring the vessel away from the coast and subsequently into Cork harbor. The damage to both the HP and LP turbine due to this casualty was so extensive that the vessel was sold for scrap.

THE LITIGATION

This suit was initiated on June 11, 1975 by Todd against Turbine Service and Gonzales demanding return of the damaged turbine parts of the KATRIN, which had been removed after the river trial casualty and taken to the shops of Turbine Service and Gonzales. Both Gonzales and Turbine Service asserted a lien for monies due from Todd on prior invoices for work done on the turbines. Owners then intervened in this action. After that Turbine Service's insurer, The Travelers Insurance Company (Travelers) and

Gonzales's insurer, Sentry Insurance Company (Sentry), were brought into the case. More recently, Siemens was impleaded. Siemens counterclaimed against Todd for unpaid bills for attendance of their representatives in New Orleans after the river trial casualty.

The title of the consolidated suits does not accurately reflect the position of the various parties. The true nature of the litigation is an action by shipowners to recover for damage to the KATRIN. The main action has had various interrelated claims, counter-claims and cross-claims of the parties engrafted onto it. The parties' claims are summarized as follows:

1. Shipowners seek to recover an amount stated to be in excess of three million five hundred seven thousand and five hundred sixty-two ($3,507,562.00) dollars for the cost of repairing the LP turbine in Germany, loss in value by reason of the casualty off Cork, detention of the vessel during the various repair periods and related survey fees, expert fees, and expenses. Shipowners have sued Todd, Turbine Service, Gonzales, Travelers and Sentry, all of whom are named as defendants.

2. Todd has counter-claimed against shipowners for the balance of its repair invoices of $175,166.00 and also for approximately $99,647.00 for work ordered by shipowners' representative after the casualty of May 24, 1975. Todd has also cross-claimed against defendants Turbine Service and Gonzales and their respective underwriters for indem-

nity in the event Todd is found liable to shipowners, together with the cost of defense and seeks to recover $40,000 paid to Turbine Service on account.

3. Turbine Service and Travelers have cross-claimed against Gonzales and Sentry for indemnity for negligent workmanship by Gonzales; Turbine Service has counter-claimed against Todd and claimed against the vessel to recover $125,000, the unpaid balance of its invoices for the initial turbine repair.

4. Gonzales has cross-claimed against Turbine Service and Todd and counter-claimed against shipowners to recover unpaid invoices of $50,000 and seeks indemnity from Turbine Service for any liability it may have to shipowners or Todd.

5. Siemens has settled with shipowners and has been dismissed from the action on condition that any liability of Siemens for the Cork casualty will *pro tanto* reduce the liability of the remaining defendants. Siemens has retained its counter-claim against Todd for the cost of its service representatives in the amount of $12,838.01.

THE ISSUES

A global summary of the issues and how I have resolved them might help in understanding the subsequent discussion. (The Appendix is a list of *dramatis personae* in alphabetical order.) It was vital to determine what caused

the river trial casualty, and I have determined that the preponderance of evidence shows that the failure of one or more low pressure rotor blades initiated the chain of damages. The ultimate loss of the ship was due to the casualty at Cork, but I have concluded that no repairer was responsible for the defect that caused that casualty. The classic questions of negligence analysis were presented here, *i. e.*, was any repairer negligent and was the negligent act a proximate cause of the river casualty. I have found all of the repairers liable to owners in tort. I have found no contributory negligence on the part of owners.

A separate but parallel route to liability urged by shipowners was breach of warranty. I have concluded that all repairers owed an obligation of diligent and workmanlike performance to the shipowners and breached it, that the breaches proximately caused the injuries to owners in each case and that the owners did not prevent or hinder proper performance in any way.

The closeness of an issue often is manifested by the energy counsel expend in arguing it. This was the case with the issue of whether Todd's release-from-liability clause was valid. I have found that the clause formed a part of the contract between Todd and shipowners, but that it was not valid in this specific situation.

The repairers generally presented a united defense against owners' attacks. However, it was necessary to decide each repairer's right to indemnity from the other

repairers. I have concluded that Turbine Service and Gonzales must indemnify Todd for the breach of their obligations of diligent and workmanlike performance to Todd.

Finally, an issue almost orphaned by counsel was whether or not Todd was liable to Siemens A.G. of Germany for various services requested by Todd after the river trial casualty. I have concluded that Todd benefitted from the services and is liable.

II. *FINDINGS OF FACT*

I now make the following findings of fact:

1. The KATRIN was a steam-powered bulk carrier with two turbines, one high pressure (HP) and one low pressure (LP). The steam from its two boilers passed through the HP turbine, entered the LP turbine, and passed from there into a condenser.

2. Simos Palios was president and part-owner of Auto Transportation and authorized to contract on its behalf, either in that capacity or in his capacity as president of Diana.

3. The KATRIN was last drydocked in approximately April, 1974.

4. On or about February 7, 1975 the KATRIN entered the port of New Orleans in need of several tons of

bulkhead repairs and boiler repairs.

5. Emmanuil Manellis, a Greek national and technical director of Diana, arrived in New Orleans shortly after the vessel had entered port and began negotiations with Todd to repair the bulkheads and boilers and to open the vessel's turbines to inspect them to determine the need for repairs.

6. On February 10, 1975 Manellis gave Todd a list of work items that he wished to have performed on the KATRIN. On February 12, William Koren, an employee of Todd, gave Manellis a letter typed on Todd stationery offering to perform those items of work requested on the February 10 list. The Todd stationery included a printed clause in small red letters near the top of the page, the address, date and salutation being typed in above the red printed clause, the text of the letter being typed below the clause.[4]

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[4] The red-letter clause read as follows:

We contract for vessel repair and drydocking and other services only upon the basis of insured limited liabilities as set forth below. In no event shall our liability for any claim arising under this contract exceed in the aggregate the sum of $300,000.00.

We are not liable for any loss, damage or delay resulting from strikes or labor difficulties, whatsoever and wheresoever occurring or for stoppage of work due to causes beyond our control.

We are not liable for defective workmanship or material or for damage to any vessel or for any loss sustained by its owners, charterers or underwriters, or parties in interest, directly or indirectly, in contract, tort or otherwise, unless the same is caused solely by the negligence of our own employees, which negligence shall not be presumed but must be affirmatively established. Our liability, if any, is strictly limited to the

7. Manellis telexed owners in Greece shortly after receipt of the February 12 offer. The telex is a verbatim repeat of the February 10 list and the February 12 offer with three exceptions: 1) the telex to owners includes none

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(Footnote 4 continued)
cost of repair, correction or replacement thereof and in no event shall we be liable for any consequential damage whatsoever including but without limitation, delay, detention, demurrage, towage, and pilotage.

We shall be discharged from all liability for defective workmanship or material or for loss or damage, unless the same is discovered prior to and claim in writing made to us within six months and litigation is commenced within one year after our work has ceased for whatever reason or has been completed, or the vessel has been redelivered, whichever first occurs.

We shall not be liable for any personal injury, including death, or for damage to property of third parties, unless the same is the result of the sole negligence of our own employees. The vessel, its owners, and all parties in interest, shall indemnify and hold us harmless from all liability arising under any air or water quality statute or regulation unless the same shall be caused by the sole negligence of our own employees.

In no event shall we be liable for the cost of defense, including attorneys' fees, of any action whether commenced by our employees, subcontractors' employees, or others against the vessel, its owners, agents, charterers or underwriters.

The foregoing is in lieu of all warranties and liabilities expressed or implied and any document which unilaterally purports to alter or increase our liability beyond that stated herein is not acceptable to us and does not form a part of this contract.

Different or more extensive liabilities will be accepted if an agreement in writing stating the nature and extent thereof is entered into before the vessel enters our yard or work is commenced, whichever first occurs, and an adjustment is made in the price which shall include the cost of appropriate additional insurance.

Nothing herein shall be deemed to constitute a waiver of our maritime lien. Invalidity of any one or more provisions of this contract shall not affect or impair the remaining provisions. This contract may not be changed orally.

of the red-letter clause; 2) some inconsequential lines giving Diana an address for forwarding boiler tubes were added to the telex; and 3) the telex included prices alongside the work items.

8. Palios did not receive any documents with the red-letter clause on them nor did he personally have notice of the existence of the clause at this time.

9. Palios received a letter on Todd stationery on April 26, 1975 including the printed red-letter clause.

10. On February 14, 1975 Manellis called Todd Shipyards and advised them that the owners had accepted the tender and would move the KATRIN to Todd. On that same day, Todd wrote a letter addressed to the "S/S 'KATRIN', c/o Diana Shipping Agencies, S.A., New Orleans, Louisiana" acknowledging that they had received instructions to begin work. This letter also contained the red-letter clause. It was presented to Manellis on board the KATRIN along with a tax exemption certificate. Manellis signed the tax exemption certificate and accepted the February 14, 1975 letter.

11. Manellis knew or should have known that the red-letter clause was part of Todd's original tender and that it applied to every order of work placed with Todd.

12. Manellis had the authority to transmit offers from Todd to the owners in Greece and to communicate

acceptances of offers from owners to Todd.

13. A contract was formed between Todd and shipowners on February 14, 1975 to perform boiler and bulkhead repairs and to examine the HP and LP turbines, as specified in the February 10, 1975 list, including as one of its terms the red-letter clause printed on the Todd stationery. Both of Todd's letters of February 12 and February 14 specifically stated that the offer or acknowledgment was "subject to all the provisions contained herein," and "applied to every order for work whether written or verbal." Owners knew or should have known that the red-letter clause was an integral part of each and every contract formed between shipowners and Todd.

14. The two contracting parties in this situation enjoyed approximately equal bargaining power.

15. It was Todd's policy to accept different or more extensive liabilities if an agreement was entered into before the vessel entered the yard or work was commenced, and an adjustment would be made in the price to include the cost of appropriate additional insurance.

16. The clause clearly and unequivocally limits Todd's liability for negligence and for all other claims to $300,000.

17. Manellis had been authorized to place work in

hand and settle prices, and Todd was aware of this authorization as of February 14, 1975.

18. Manellis had express authority to tell Todd what work had to be done, receive bids from Todd, pass them on to Palios, and pass the message from Palios to Todd if the bid was acceptable.

19. Todd contracted with Turbine Service to open up the vessel's turbines for inspection.

20. On February 26, 1975 Jan D. Van Rynbach, an independent surveyor hired by owners, prepared a field survey of the damage to the KATRIN's boilers and turbines after viewing the equipment with the upper casings of the turbines removed and the rotors still in place in the lower casings.

21. Van Rynbach telephoned Palios in Greece to report the results of the survey. Palios gave Van Rynbach an order to have Todd begin repairs in accordance with the field survey, and the field survey was given to Walker Coleman, Todd's contract negotiator and estimator.

22. The items in the "Found" column of the February 26, 1975 field survey by Van Rynbach and Keith Harvey, a London Salvage Association surveyor, are correct descriptions of the damage found in the HP and LP turbines of the KATRIN as of that date. I make no finding on whether or not the survey fails to mention damage that

did in fact exist.

23. The "Recommended" column of the February 26, 1975 field survey shows the following recommendation for the LP turbine rotor blading: "L.P. Turbine Rotor to be removed to shop. All blading of Ahead part to be removed and renewed. Spare blading to be supplied by Owners from ship's spares. Afterwards rotor to be balanced."

24. In order to lift the top half of the LP ahead turbine casing from its normal position, it was necessary to work on the bolts and nuts with a cutting torch, to knock out the bolts with pins and to drive a chisel in between the parting faces of the turbine casing halves to pry them loose.

25. Jon Sheridan, supervisor of the KATRIN job for Turbine Service, testified that opening the LP and HP turbine was not any more difficult than usual, and that such jobs are always difficult.

26. None of the surveys conducted in February of 1975 revealed any distortion in the casings of the LP ahead or astern turbines.

27. Todd was aware of a warping in the astern turbine casing sometime before the repair job was completed.

28. Based upon the field survey conducted February 26, 1975, Todd began to investigate methods of repair and

availability of spare parts to determine whether or not the LP turbine could be repaired at Todd.

29. On February 28, 1975 a work specification was agreed upon between Manellis and Todd to remove broken blades, furnish and install new blades, straighten all bent blades and rebalance the LP rotor. In addition, it was agreed to renew or straighten stationary blading in the upper and lower casing as found necessary.

30. In spite of the fact that the original field survey recommended renewing the entire blading of the LP rotor, such a course of repair was either ignored by Manellis or specifically rejected by February 28, 1975.

31. Because Todd's labor force was occupied and its shops were crowded, Todd asked Turbine Service to conduct the investigation of potential methods and material in order to determine whether or not Turbine Service could be granted a subcontract to repair the LP turbine.

32. Todd had contracted with Turbine Service on other previous jobs for opening and closing of one main turbine, reblading turbine generators, major rotor work, sea valves, piping and smaller steam turbine work.

33. Todd conducted no independent investigations of the qualifications of Turbine Service to conduct a major steam turbine reblading job before the investigation of methods began.

34. Manellis was not aware of the fact that Turbine Service was a separate and distinct entity from Todd nor did he ever visit the facilities at Turbine Service.

35. On or about February 28, 1975 Todd's purchasing department called Siemens A.G. in Germany to determine whether or not they could manufacture replacement blades for the LP turbine.

36. By March 3, 1975 a decision had been made to accomplish repairs on the LP turbine rotor more or less in accordance with the recommendations of the field survey. However, two different alternatives were being considered for rotor Rows 11-14. The understanding was that, if Turbine Service could locate replacement blades, Rows 11 through 14 would be rebladed and considered a "permanent" repair. If those blades could not be located, the blades of those rows were all to be cut off smooth at the root to allow the ship to return to service minus those rows of blades.

37. On March 4 or 5, some spare replacement blades were located aboard the KATRIN. It was not known at that time how many were proper replacement blades for the damaged blades in the LP rotor. Approximately 557 replacement blades awere needed for the various rows of the LP rotor.

38. Informal discussions between Todd and Turbine Service sometime between February 28, 1975 and March 7,

1975 resulted in an understanding that Turbine Service was to accomplish the repair work on the LP turbine and that Turbine Service would be able to find sufficient replacement blades to accomplish the permanent repair.

39. Manellis had never been involved with opening a steam turbine before nor had he ever observed a turbine reblading job before.

40. It is not unusual that a chief engineer or a person with experience equivalent to that of a chief engineer has not participated in a major turbine repair throughout the course of his career.

41. Manellis left New Orleans on March 7, 1975, arrived in Greece on March 8 and retired from service.

42. When Manellis arrived in Greece on March 8, 1975, he did not give Palios a report on the technical details of the repair discussions in New Orleans; he did not tell Palios about any procedure for reworking and replacing blades. Manellis gave Palios some photos and an unused, non-welded blade.

43. Neither Manellis nor Palios knew that Todd or Turbine Service planned to replace LP turbine rotor blades by welding old roots to new airfoils.

44. When Manellis left New Orleans on March 7, 1975 owners had not yet made a decision to authorize the

replacement of rotor blades in the LP turbine. Todd was prepared to receive a telex on March 11 authorizing permanent repairs and was, in the meantime, authorized to proceed with the other repairs, known as temporary repairs.

45. Owners telexed Todd on March 10, 1975 authorizing permanent repairs and asking for a breakdown of expenses and a reconfirmation of time.

46. The contract to repair the LP turbine included the red-letter clause as one of its terms.

47. Jon Sheridan of Turbine Service, after a trip to the northeastern United States, returned to New Orleans on March 14, 1975 with turbine blades with a profile very similar to the KATRIN's LP rotor blades. He took four or five of these blades to Gonzales with old roots taken from the LP rotor. He asked Ronald Hoover, supervisor of the KATRIN job for Gonzales, to mill off the rotor root, cut the root off the new blade and mill it off to weld the old rotor root to the newly procured airfoil.

48. Hoover told Sheridan he wasn't sure he could do it but he would try. Dale Saint, Gonzales' welder, asked Sheridan to tell him the metallic composition of the old roots and new airfoils. Sheridan did not know the metallic composition nor did anyone else who undertook to weld the four or five blades.

49. Saint consulted a welding manual at Gonzales

and determined that a 309 Stainless rod was recommended for dissimilar metals. Gonzales did not have any 309 Stainless rods so Saint decided to use a 308 Stainless rod since in his opinion it was very close to a 309.

50. After welding the sample blades, Sheridan put one or two of the newly fabricated blades in a vise and he and Hoover bent them and hammered them to determine the strength of the weld.

51. Sheridan took the remaining welded blades, saying that he would do some tests on them and take them to Todd and the shipowners for approval.

52. Sheridan's testimony that he met with Manellis on the KATRIN on or about March 17, discussing the welded blades with him and giving Manellis the remaining fabricated sample blades to take back to Greece with him, was not credible testimony.

53. The testimony of Sheridan that Bergeron, Todd's assistant general manager, was well aware of the fact that Turbine Service was going to weld blades, was not credible testimony.

54. On March 18, 1975 Diana telexed Todd asking again for advice of "present estimate of cost and time involved for permanent repairs now in hand."

55. Sometime between March 17 and March 20,

Charles Woods, vice-president of Turbine Service, and Sheridan prepared a proposal estimating repairs necessary to return the HP and LP turbines to service. Two estimates were submitted, the first including removal, repair and straightening of the first ten rows of LP rotor blades with replacement of 38 blades in those ten rows, the removal of Rows 11, 12, 13 and 14 of the rotor and 5 rows of stationary blades, called "temporary repairs." The second option, the "permanent" repairs, included everything outlined in the temporary repairs except that the 4 rows of rotor blades were to be replaced and the damaged stator blades were to be replaced or repaired.

56. Turbine Service's estimate was dated March 4, 1975 in spite of the fact that it was not prepared until sometime after March 17, 1975.

57. On March 20, 1975 Todd telexed Diana in Greece quoting a price breakdown for permanent repairs in the lump sum of $273,269.00. This telex indicated that the price breakdown was "per field survey, crew negligence, January 31, 1975, and as quoted to Mr. E. S. Manellis March 4, 1975."

58. In spite of the fact that the March 20 telex from Todd to Diana indicates that it is "per field survey" of January 31, 1975, the price given for LP turbine rotor blading and LP turbine stationary blading of $148,891 was not high enough to indicate that the parties contemplated renewal of all LP rotor blades as had been recommended in

Van Rynbach's field survey.

59. The price quoted by Todd to Diana for repair of the LP turbine rotor and stationary blading was $148,891. Total work on the HP and LP turbines of the KATRIN was priced at almost $200,000, more than 70% of the $273,269 quoted for all work contemplated.

60. On March 21, 1975 Todd issued purchase orders to Turbine Service for repairing the HP turbine rotor and LP turbine. The LP purchase order confirmed an order dated March 4, 1975 made to Sheridan by telephone. The HP purchase order confirmed an order made by telephone to Sheridan on March 6, 1975. Both purchase orders stated that "all work was to meet approval of Todd, owners and regulatory body." The letter and two purchase orders are the best reflection of the contract between Todd and Turbine Service.

61. The LP purchase order required that "Four rows of blades...be replaced and damaged stators...be replaced or repaired." The back of the purchase orders stated that the work could not be subcontracted and that all goods and labor were to be warranted by Turbine Service to be merchantable and fitting in all respects for the purpose for which intended. It also stated that if goods and labor were approved, such approval should not in any way be construed as a waiver of any warranties, express or implied, and that Turbine Service would guarantee to Todd that all the material, equipment and labor be guaranteed in the

same manner and to the same extent that Todd was required to guarantee such material, equipment and labor to its customers.

62. On March 21, 1975 Gonzales received an order from Turbine Service to "modify turbine blades and repair" from Sheridan based upon an estimated price of $43,800.

63. Sheridan's testimony that Turbine Service did not authorize Gonzales to start work on the repairs before April 1 is not credible.

64. Sheridan told Hoover to "do all the rest of the blades the same way." Sheridan assured Hoover the welds were good and that they had been accepted.

65. When Hoover advised Sheridan that Gonzales could not test the welds, Sheridan told Hoovaer that that was not necessary since Turbine Service had already planned to test them.

66. I. J. Saenz, Jr., a Gonzales employee, machined the new blade foils to prepare them for welding. Sheridan told him how he wanted this done. The new blade was cut off with one-sixteenth of an inch of its root remaining in order to weld it onto the old root. The old blade roots were also cut off with some material left for welding purposes. The cutting was done with an abrasive saw followed by a fly cutter.

67. Todd assigned Gordon Ault as ship's superintendent. He was in charge of the job for Todd.

68. Ault was familiar enough with turbines to know if any problems arose and to inform his superiors.

69. Ault was serving on two or three jobs as ship's superintendent at the same time. Although he considered himself to be supervising Sheridan "in a round about way," since the job was subcontracted, Sheridan "was supervising himself, really."

70. No one at Todd had any dealings with Gonzales, no contract was made between Todd and Gonzales and no direct payment was made by Todd to Gonzales.

71. The overwhelming weight of testimony at the trial shows that welding two different parts of a steam turbine rotor blade onto one another is not considered prudent engineering practice.

72. The preponderance of testimony at trial showed that the only proper way to weld airfoils to blade roots such as those in question in this case would be to effect a full penetration weld between the two parts so that there was no discontinuity of any kind across the cross-section of the weld. Testimony also showed that such a welding procedure would have been much more time-consuming and expensive than the procedures actually used.

73. The preponderance of evidence produced at trial showed that the standard of conduct expected of a reasonable repairer in the ship industry would require a contractor to refuse to do a job that was considered unworkmanlike, even if ordered to do so by a customer unless the customer had been fully informed of the risk of failure and had assumed it.

74. Turbine Service did not perform any work on the LP astern casing.

75. Turbine Service accomplished the following work on the LP turbine: welded various spots on LP blades and ground the welds smooth; inserted shims between the blade roots, replaced some stator blades from ship's spares; removed some rotor blade roots to take to Gonzales for fabrication of new blades; placed the newly fabricated blades back in their grooves in the LP rotor; attached shrouding rings in a full circle around the tips of Rows 11 through 14 of the LP rotor using the tenons protruding from the purchased airfoils; and reinstalled the turbine casings and rotor in the vessel.

76. Turbine Service accomplished the following work on the HP turbine: straightened damaged HP rotor blades; inspected all HP blades and "dressed" burrs on the upper edge of the HP rotor blades without grinding or filing any "feather edges" or "feather tips" of the HP rotor blades.

77. Plaintiff failed to show by a preponderance of

evidence that any repairers ground off the feather edges of the HP rotor blades or caused excess clearances between the tips of the blades and the HP casings.

78. Plaintiff failed to show by a preponderance of the evidence that the feather tips of the HP rotor blades were intact when the vessel first entered Todd.

79. Gonzales accomplished the following on the LP turbine: machined and welded all fabricated blades, including four different sizes of blades; manufactured spacer rings according to measurements given to them by Sheridan and installed these rings around the inside circumference of the LP turbine casing situated in such a way as to close the steam-passage gap caused by the short blades in Rows 11 through 14 of the rotor; and balanced both the HP and LP rotors on their balancing equipment.

80. Gonzales manufactured one-half of one spacer ring inaccurately so that it did not complete a full circle. On orders from Sheridan, it filled up the gap left with brazing material.

81. On May 14, 1975, Hoover met Sheridan at the Painted Pony Bar near Todd and presented him with a release-from-liability statement which Sheridan willingly signed.

82. On May 15, 1975 Gonzales billed Turbine Service in the amount of $43,800 less a 5% discount of $2,190 for a

total of $41,610 for an item entitled "modify turbine blades and repair."

83. On or about May 14, 1975 Sheridan presented Van Rynbach with a previously requested list of the work that Sheridan had accomplished. This statement was typed on a plain sheet of paper without any signature.

84. On or about that same day Sheridan gave the same work list to Keith Harvey pursuant to Harvey's request.[5]

85. The testimony of Sheridan that he did not prepare these statements was not credible. I find that Sheridan did prepare the two statements.

86. The statement referred to the blade replacements as "new blades manufactured involving four complete rows. An additional 63 blades were made for rotor at various rows." No mention was made of welding old roots to new airfoils.

87. On May 16, 1975 Van Rynbach, Harvey, and

[5] At trial, Sheridan vehemently denied preparing or delivering the statements. Owners filed into evidence a letter from a typewriter expert who had studied the statements and other documents, including a letter signed by Sheridan on Turbine Service stationery and a report previously identified as being from Turbine Service. The expert concluded that the statements in dispute had been typed on the same typewriter as the one used on the identified documents. Counsel for Travelers conceded in his post-trial brief that someone at Turbine Service did apparently prepare the statements.

Coleman set the final prices for the repair work done. The prices were negotiated using the original quote as a base (altering prices if the repairs in fact did not conform to the original plan) and quotations as of the March 20, 1975 telex.

88. Even though it was written in the future tense as if the work were still to be done, a revised field survey was prepared and dated May 14, 1975 with the "Recommended" column reflecting the actual work done rather than the work projected. Item 6 of that revised field survey reflected that Rows 2-5 of the LP ahead part were "to be removed and completely renewed. Necessary blading to be manufactured." The convention used in numbering the LP rotor blades in the field surveys prepared by Van Rynbach was opposite to the conventions used by all other surveyors and witnesses at the trial so that Rows 2 through 5 in the Van Rynbach surveys correspond to Rows 11 through 15 in other testimony and documents.

89. At the final price-negotiation meeting, no one mentioned anything about welding of new blades onto old roots and the procedure is not mentioned in any of the documents relating to that meeting.

90. On May 17, 1975, Van Rynbach wrote Diana to certify the final field survey including information that the total cost was $337,161, exclusive of any overtime charges, and was agreed to by all parties concerned as fair and reasonable. That letter also mentioned that Todd was to

submit separate invoices to owners for ten separate items. This letter is the best expression of detail work contemplated by the contract between Todd and owners.[6]

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[6] The contract terms pertinent to the LP turbine repair were as follows:

> L. P. Turbine inner and outer casings to be disconnected and lifted for inspection. L. P. Rotor to be disconnected and lifted for further inspection, and to be rigged out of the engine room. Rotor to be transported to the shop for repairs. Rows Nos. 2, 3, 4 and 5 of ahead part to be removed and completely renewed. Necessary blading to be manufactured. Remaining blading of ahead part, Rows Nos. 6-15 to be faired and dressed, and a total of 63 blades in these rows to be renewed. Necessary blades to be manufactured. Blading of Row No. 1 to be removed, faired and refitted. All affected blading to be checked for cracks.
>
> Afterwards, rotor to be dynamically balanced, transported back to ship. rigged into the engine room and reinstalled in good order. Clearances to be checked and adjusted as necessary. L. P. flexible coupling to be removed, cleaned and afterwards reinstalled in good order.
>
> Alignment between L. P. Rotor and Pinion to be checked and adjusted as necessary.
>
> Labyrinth packing in way of lower L. P. Turbine casing to be removed and part renewed.
>
> Upper and lower halves of L. P. Turbine casing to be disconnected, rigged from engine room and transported to shop. Stationary blading to be removed, faired and dressed as necessary and afterwards reinstalled in good order.
>
> Casings to be transported back to shop, rigged into the engine room and reinstalled in good order.
>
> Forward and after journal bearings to be opened up, bearing shells taken to shop, remetalled, machined, transported back to ship and placed on board as spares.
>
> Damaged spare bearings to be taken to the shop, remetalled, machined, transported back to the ship and installed in good order. Rotor journals to be polished.

91. The bulkhead and minor miscellaneous repairs in the engine room necessary in February 1975 would have required about three weeks to complete if there had been no repairs to be carried out on the boilers and turbines.

92. Stylianos Tsaknaris, a Greek national, was the chief engineer on the vessel from March 25 to May 24, 1975 and owners stipulated at trial that he was authorized to place work in hand and to settle prices during that period. Todd was aware of this authorization.

93. Tsaknaris was not an experienced steam turbine engineer.

94. No evidence was presented at trial to show that Tsaknaris knew that LP rotor blades had been welded together. The only testimony tending to show that Tsaknaris had knowledge of such welding was presented by Sheridan and was not credible.

95. Tsaknaris was present at Gonzales on May 7, May 9, and May 13 while the LP turbine rotor was being balanced. On one of those occasions, Tsaknaris made a comment indicating that he was aware of the existence of shrouding on Rows 11-14 of the turbine rotor.

96. Tsaknaris had difficulties with the English language.

97. After the last balancing, Tsaknaris said that he

would accept the LP rotor as being balanced.

98. By May 7, 1975 Tsaknaris either knew or should have known in the exercise of reasonable diligence that subcontractors were performing some of the work on the LP rotor.

99. Ault from Todd was present at one of the balancings and did not observe that the blades were welded onto old roots. Olaf Olsen, III, a Germanischer Lloyd surveyor, was present at one of the balancings and was not aware of the fact that the blades were welded to old roots. Van Rynbach was present at one of the balancings and was not aware of the fact that the blades were welded to roots.

100. At the trial, all witnesses except Sheridan and Gonzales personnel denied any knowledge of the fact that old roots were being welded to new blades.

101. McPhate, an engineering professor called to inspect the LP turbine rotor after the river trial casualty in late May, testified that it was not obvious to him that the blades were welded when he looked at the rotor but that someone told him later.

102. Ault testified that he closely inspected the LP rotor to see the blade repair work but failed to see the welding because he wasn't looking for it.

103. Olsen said that at the first LP balancing he

touched the blades and felt that they were jiggling but did not notice any difference in the blades.

104. None of the owners' representatives or representatives of Todd Shipyards knew that the new airfoils had been welded to old roots on the LP rotor.

105. The LP turbine casing and rotor were installed by Turbine Service sometime between May 14 and May 20, 1975.

106. The lower casing was set in place and the rotor lowered down into it. Clearance measurements were taken.

107. Somewhere close to Rows 13 and 14, rotor blades were touching the neighboring stator blades so that the rotor would not rotate. To correct this condition, Adams of Turbine Service heated the base of the stator blades to a red-hot condition with a welding torch and tapped on the blades with a hammer to straighten them out and allow the rotor to turn freely in the lower casing.

108. When Turbine Service attempted to lower the upper casing down over the guide rods, the casing became jammed and had to be forced down on top of the lower casing. The casings would not fit flush with one another at the parting faces in spite of Turbine Service's attempts to tighten the bolts down.

109. Ault told his superior at Todd, O'Neil, that there was some difficulty with the reinstallation. Tsaknaris and Bergeron were also aware of the difficulty.

110. O'Neil and Sheridan agreed that heating the casing in the vicinity of the bolts would help tighten down the casing.

111. Tsaknaris was aware that such a procedure was being used and did not attempt to stop it. Tsaknaris did express his unhappiness with the heating procedure to Bergeron but did not order him or anyone else at Todd to stop the job or the reinstallation of the turbine.

112. Ultimately the ahead turbine upper casing was successfully tightened down on top of the lower casing.

113. The LP ahead casing was distorted to some unknown degree at the time of reinstallation in the vessel and before the river trial casualty.

114. The LP astern casing was distorted to some unknown degree prior to the time of reinstallation and before the river trial casualty.

115. Heating of the LP turbine ahead casing did not cause the distortion and out-of-roundness present at the time of reinstallation.

116. Shipowner's expert surveyor Higgins attempt-

ed to make a claim on behalf of the owner against underwriters for the warped casings in June or July of 1975 basing the claim on the theory that it was attributable to an incident of crew negligence that occurred on January 31, 1975, shortly before the vessel entered New Orleans.

117. Higgins changed his view as to the cause of the distortion in the casing after he heard evidence that the repairers had heated the casing in attempting to close the LP turbine. After the river trial casualty Higgins observed and recorded a distortion or warping in the astern casing by taking measurements with the top half placed on top of the bottom half of the casing.

118. On May 29, 1975, after the river trial casualty, Gonzales prepared a drawing of the ahead casing. This showed the lower half casing diameter measured from parting face to parting face (horizontal diameter) .107" shorter than the diameter of the upper half from parting face to parting face. With the casing halves placed on top of one another, the horizontal diameter was less than the vertical diameter by at least .048".

119. Higgins had observed LP rotor clearances being taken in Rotterdam in April of 1973 and considered the clearances to be proper and the casings to be round.

120. The turbines were operated with steam at the dock trial on May 21, 1975, manifesting a noise that was caused by a pinion gear improperly assembled by the crew.

This was corrected before the second dock trial.

121. Todd determined that an LP support bearing had "wiped" (a technical term meaning bearing metal had been rubbed away) during the first dock trial and had to remetal and remachine the bearing before the second dock trial.

122. On May 23, 1975 a second dock trial was accomplished, starting and stopping both the ahead and astern turbines several times, reaching a maximum RPM of 65 RPM ahead and 20 RPM astern. Total time of the dock trial was 3½ hours. The turbine itself manifested no noises or irregularities at the second dock trial. Gear noise was heard both ahead and astern but all bearing temperatures were normal. Tsaknaris gave the OK ending the dock trial.

123. Any testimony by Sheridan that the turbine was scraping when it was running on the jacking gear during the second dock trial was not credible.

124. During the second dock trial, the LP rotor turned freely in place without touching any part of the casing or casing blades.

125. The port and starboard clearances between rotor blades and stationary casing parts at the parting faces of the LP ahead turbine were below manufacturer's recommended clearances.

126. The river trial began on Saturday, May 24, 1975 enroute to a loading berth where the vessel was to pick up cargo.

127. Mussachia was Todd's representative on board the vessel during the river trial.

128. The river trial began at approximately 9:00 A.M. Speed was steadily increased up to 75 RPM at 9:45 A.M. The engine was run at 80 shaft RPM for approximately 2 hours. The shaft RPM was raised to 85 RPM at about 11:40 A.M. when Mussachia heard a ping, a noise like "a nail thrown against a tin building." This ping was followed by two more pings, Mussachia gave the order to the chief engineer to stop the engine. The pilot would not let the engines stop immediately because there was no proper anchorage. The pinging noises were followed by "scraping noises" or "groaning."

129. After the engine was stopped, the turbine was turned by electric motor to avoid distortion due to rotor shaft sag.

130. Prior to the pinging sound there was an increase on the LP astern bearing of 3.1 degrees, over the course of an hour.

131. The turbine did not reach full operating temperature during the river trial.

132. The vessel was anchored 8-10 miles upriver from Todd. The LP rotor bearings and thrust bearings were inspected and found to be wiped.

133. Sheridan was not on board during the river trial but went on board at St. Rose before the vessel was towed back to the yard on Sunday, May 25, 1975.

134. After the river trial casualty Sheridan selected ten blades to be tested by an independent testing laboratory. These ten blades were tested using destructive testing techniques in what is known as a pull test. The first five blades tested broke under tension at 9,500 pounds, 18,000 pounds, 21,800 pounds, 17,000 pounds and 18,500 pounds. The second set of five blades tested broke at 21,020 pounds, 17,050 pounds, 18,000 pounds, 15,000 pounds and 22,000 pounds.

135. Nine expert witnesses expressed their opinions as to the cause of the river trial casualty.

136. McPhate, the mechanical engineering professor calculated that the maximum total centrifugal force applied to the blades of Row 14 with the shrouding attached would be 3,483 pounds at a turbine speed of 3.950 RPM. He also testified that his force calculation would increase by the square of the increase in speed.

137. Higgins testified that the maximum turbine speed was 5,000 RPM. I find that the centrifugal force ac-

cording to McPhate's calculations would be approximately 5,400 pounds at a maximum speed of 5,000 RPM.

138. The cause of the damage to the LP turbine during the river trial on May 24, 1975 was the failure of a weld in one or two Row 14 rotor blades causing the fracture of the blades at the weld. One or two rotor blades plus attached shrouding tore loose and the loose parts jammed between rotating and stationary parts of the turbine. The turbine was thus thrown out-of-balance. All damage which resulted was caused by the broken rotor blade or blades.

139. The river trial casualty was not caused or aggravated in any way by whatever distortion existed in the LP ahead turbine.

140. Ault prepared a list of LP rotor and casing conditions after the river trial casualty.

141. McPhate also prepared a report of his May 30, 1975 inspection of the LP turbine.

142. Surveys were conducted on June 3, 1975, June 11, 1975 and July 21, 1975, the latter being the final joint survey of the damage from the river trial casualty.

143. Todd requested that Siemens send a representative to aid in the investigation of the casualty and possibly to supervise repairs. Heinz Distelhut of Siemens arrived on May 28 or May 29.

144. The price charged by Siemens for the attendance of its personnel after the river trial casualty was fair and reasonable.

145. Palios arrived in New Orleans with Higgins on June 5, 1975.

146. On June 6, 1975 Siemens telexed Bergeron at Todd that new blades could not be delivered before the middle of September and "welding on blades cannot be accepted by us."

147. Palios, Higgins and Todd personnel met on June 9, 1975 to discuss problems caused by the river trial casualty. Temporary repairs were contemplated consisting of removing Rows 11-15 of the stator, removing Rows 11-15 of the rotor, balancing the rotor and reinstalling with proper alignments and clearances. Todd estimated that such work would take about 3 weeks.

148. Bergeron and Meghrian, of Todd, assured Higgins and Palios that the vessel's turbines would be put in order.

149. Bergeron testified that it was Todd's responsibility to put the turbines back in order after the river trial casualty.

150. The classification society, Germanischer Lloyd of Hamburg, agreed to the temporary repairs specified

above.

151. The owners gave Todd authorization to re-open the HP turbine for checking on July 16, 1975.

152. On July 17, 1975, after fly ash blasting, the Siemens' representative recommended that temporary repairs not be performed on the LP turbine. They recommended a complete overhaul at their own workshop in Germany with complete new blades for the stator and rotor.

153. On July 18, 1975, all parties were notified of a final field survey to take place on July 21, 1975.

154. On July 21, 1975, a field survey was made with Higgins, Harvey, Bergeron, Tsaknaris, O'Neil, Ault, Meghrian, Sheridan, Richter as well as other personnel. The results found were reported in a document dated July 21, 1975. This document accurately reflects the condition of the LP turbine after the river trial casualty.

155. On July 22, 1975 Siemens telexed Todd that the time for manufacturing Rows 1 through 14 stator and rotor blades would be about three months, with one more month being necessary for dismantling and reblading the stator and the rotor.

156. On August 19, 1975 Diana authorized Todd to arrange with owners' agents Hansen and Tidemann to collect all parts of the LP turbine for shipment to West Ger-

many for repair. This decision was made by the shipowners.

157. The HP turbine was opened as requested by owners and the damage was inspected by owners' surveyor Higgins. No HP rotor blade clearances were taken at this time. The HP was closed up after an undetermined period of time. In July/August, 1975, neither owners nor Todd was aware of the fact that the rotor blade tip clearances were excessive.

158. Higgins did not check clearances of the HP rotor blades in July of 1975 because Bergeron had told him that the clearances would be furnished to him on both the HP and the LP. Neither Sheridan nor Bergeron showed any clearances of any kind to Higgins before January of 1976.

159. The LP turbine was repaired and reconditioned by Siemens in West Germany with extensive reblading, remachining, reboring, removal of Row 15 of the rotor and the addition of shrouding strips on several of the rotor blade rows.

160. The LP turbine was shipped back to New Orleans in early January, 1976.

161. Higgins was commissioned by the owners to attend the reinstallation of the LP turbine. Two Siemens personnel were ordered by owners to aid in the installation.

162. Todd made an offer to reinstall the LP turbine for $29,000.

163. Ardell Marine Engineering Corporation of Brooklyn, N.Y. and two New Orleans firms were hired to help reinstall the LP turbine instead of Todd.

164. The KATRIN was removed from the Todd berth to a city pier for reinstallation.

165. Higgins became concerned because of the unavailability of any HP clearances and decided to open the HP turbine to take rotor blade clearances.

166. The HP turbine was opened on January 29, 1976. On February 6, 1976 clearances were taken on the HP rotor blade tips.

167. Higgins had observed clearances being taken in Rotterdam in April 1973 and spot-checked those clearances himself. The increase in rotor blade tip clearances between the Rotterdam inspection and the February, 1976 inspection varied from 0.4 mm to 1.3 mm. The clearances for the stator blades of the HP had increased by only about 0.05 mm over that same period of time.

168. Higgins made a close examination with a magnifying glass, noting that there were marks on the ends of the HP rotor blade tips, not visible to the naked eye, which looked like filing or scratch marks.

169. Higgins discussed this problem with the Siemens engineer, Warnkross. They agreed that the excess clearances would cause decreased efficiency of the HP turbine, increased consumption of fuel oil and an increase in the HP turbine exhaust temperature.

170. It would have taken approximately 130 man hours to file off the tips of the HP rotor blades while spinning the HP rotor in a lathe.

171. Higgins informed Palios that there were excessive HP clearances but together the two of them decided that the HP could be closed and the vessel put into service.

172. The KATRIN took on cargo, leaving New Orleans on March 2, 1976.

173. It was reported to Higgins that the vessel was experiencing excessive condenser top temperatures after leaving New Orleans. Because of this, when he attended the vessel at Birkenhead on June 7, 1976, Higgins checked the HP clearances once again and determined they had not changed since New Orleans.

174. Higgins installed a new, higher range thermometer to the condenser top to allow the crew to be able to monitor the temperatures more closely.

175. On July 10, 1976, 3-5 miles from Cork, the

KATRIN was required to reduce speed to 45 shaft RPM because of difficulties with one boiler. This continued for 4 hours. The engine began to vibrate for 3 or 4 minutes and then stopped at 10:00 P.M. The current pulled the vessel toward shore and the captain forced the chief engineer to start the engine again to save vessel and crew.

176. When the engine was re-started, the crew was on deck preparing to abandon ship.

177. The engine was successfully started and run at 45 RPM for 2 hours, moving the ship 10 miles away from the coast.

178. The cause of the Cork casualty was the excessive blade tip clearances of the HP rotor. Excessive steam was allowed to pass through the gap between the rotor blade tips and the casing, the temperature drop across the HP turbine was decreased so that the temperature of the steam exiting the HP turbine was excessive, the steam exiting the LP turbine and entering the condenser was excessively hot, and the condenser top temperatures increased to a dangerous degree.

179. The excessive condenser top temperatures caused unusual expansion in the LP turbine. The turbine could not tolerate such heat and grew to such a degree that it seized. This caused all of the subsequent damage found when the turbines were later opened for inspection.

180. Since it was not economically feasible to repair the KATRIN, it was sold for scrap on February 8, 1977 for a price of $364,800.

181. The value of the vessel at the time of the Cork casualty was $850,000.

III. *LIABILITY*

CAUSE OF THE RIVER TRIAL CASUALTY

[1] As I have said, the principal issue in this case is the cause of the breakdown of the KATRIN's LP turbine on May 25, 1975. The ultimate burden of proof is on owners to establish the cause of that breakdown. I have found that a defective weld on one or two LP rotor blades precipitated the casualty. Although repairers have advanced other theories of the cause of the casualty, the preponderance of evidence favors the findings I have made.

After the river casualty, one thing was undebatable: two LP rotor blades from Row 14 were broken at the root. Owners' expert welding witness Arthur Kugler testified that the welds between the new airfoils and the old roots were "non-penetration welds." This testimony was uncontradicted. In essence, the new airfoil was set down upon the old root and the two pieces were welded together around the four sides of the rectangle, leaving the unreachable mating surfaces in the center of the cross-section unwelded and unconnected. Kugler testified that the gap in the

center of this fabrication would tend to grow like an air bubble as the rotor increased speed up to 5,000 RPM. He emphasized that the moving blade would be subjected to cyclical stresses as it rotated, such stresses causing fluttering of the blade and further localized increases in stresses.

This is not the first time that a court has faced the problem of a "non-penetration weld." In a case in the United States Second Circuit Court of Appeals a helicopter crash was allegedly caused by the failure of a steel tube welded to a stabilizer bracket on the helicopter's tail. The court's discussion of expert testimony in that case has a familiar ring:

> The root of a weld is the point at which the surfaces of the two pieces of metal being welded come together, at right angles in the present case. Incomplete root penetration occurs when the weld metal does not sufficiently penetrate this area where the surfaces of the metals are in contact. Holshouser [libelants' expert witness] testified that incomplete root penetration would result in increased stress concentration at the point where the weld metal is joined to the tubing, near the root of the weld, and would reduce the load which could be transmitted between the horizontal stabilizer bracket and the longeron.... [Stewart, another expert witness,] testified in detail to the effect that incomplete root penetration in the weld would cause normal stresses originating in the horizontal stabilizer to be sidetracked through the weld metal to a necessarily weaker and more brittle part of the weld area rather than being passed directly through the root of the weld.

Krause v. Sud-Aviation, Societe Nationale de Constructions Aeronautiques, 413 F.2d 428, 430 (2nd Cir. 1969).

Owners' expert witnesses in this case provided a similar explanation of the failure mechanism. Kugler testified that the welds he observed on some of the fabricated blades could not withstand severe stress. Harrison viewed many of the welds of the blades tested after the casualty and condemned all of them he observed as being defective. Higgins made note of the lack of penetration on the welds and explained that the gap in the interior of the weld would act like a fracture under working conditions. After a certain amount of time, the fracture or split would propagate, move into the existing weld and lead to a failure. All of the experts awere agreed that the maximum stress concentration occurred at the point where the cross-section was abruptly changed, that is, where the root left off and the airfoil began. That is where the blades were welded by repairers.[7]

Of course, an adequate and consistent explanation of how an accident may have occurred is not evidence that it in fact occurred that way. What evidence supports owners' hypothesis? Some major confirming evidence is provided by the "ear-witness" account of Todd's employee Mussachia. His description of the three "pings" followed by a scraping and rubbing conforms to the hypothesis that one or more rotor blades broke at the weld. As described by

[7] *See generally* 1 L. Frummer & M. Friedman, Products Liability § 6.03[3] (1978) for a discussion of failure mechanisms in metal parts or structures.

various experts, if a rotor blade broke, it would fly off and hit the casing or neighboring blades at a very high speed. This could have caused the "ping" that Mussachia heard. Since there were two blades and pieces of shrouding attached to those blades that were found to be ripped off after the casualty, it is also consistent that Mussachia heard more than one ping. Higgins and Harvey both testified that pieces of blade or shrouding spinning around in the LP turbine would most likely become jammed between moving and stationary parts, an occurrence that would very likely give rise to scraping or groaning noises that Mussachia heard. Expert witnesses also explained that when one or two rotor blades and shrouding break loose, an LP turbine is thrown out of balance so severely that it begins to rotate in an eccentric pattern, thereby coming in contact with the casing and other stationary parts. This is a further explanation for the rubbing and scraping sounds.

After the river trial casualty, Turbine Service sent ten sample blades to a testing laboratory to be subjected to a pull test. All of the blades broke at the welds. One blade broke at an applied force of 9,500 pounds, and the balance broke at an applied force of 15,000 pounds or more. Turbine Service's expert witness McPhate calculated that the centrifugal force that would be applied to a Row 14 rotor blade at a speed of 3,950 RPM would be 3,483 pounds.

Static testing is not a final indicator of whether or not a part will stand up in service. Numerous cases support this assertion. In the famous case of *Sierackí v. Seas Shi-*

ping Company, 149 F.2d 98 (3rd Cir. 1945) a 10-ton boom on a vessel was tested by lifting a dead weight of 12½ tons before turning the vessel over to the shipowner. Later, the boom broke under a weight of 8.2 tons or less, causing injury to a seaman (not to mention the injuries it caused to courts later faced with cases involving "Sieracki seamen"). The court found that other and more searching tests could have been made and should have been made in the exercise of reasonable care. The Fifth Circuit has more recently upheld a trial court's conclusion that static testing of a chain hoist at loads of one and one-half times its rated capacity was not sufficient to reveal a defective weld in a link that failed. *Watz v. Zapata Off-Shore Co.*, 431 F.2d 100, 114-115 (5th Cir. 1970).

Owners' counsel objected that the turbine's operating speed was higher than 3,950 RPM and elicited from McPhate the concession that the centrifugal force would increase with the square of the increase in speed above 3,950 pounds. Nonetheless, using all Professor McPhate's other assumptions, the maximum centrifugal force at the maximum turbine speed of 5,000 RPM would be 5,400 pounds. Repairers have asked me to join them in their inference that since the maximum centrifugal force was no more than 60% of the breaking force necessary to fracture the weakest of the ten test blades, the blade welds could not have failed in service on the river casualty. It should be noted that Professor McPhate did not testify that this inference was supportable. He merely said 9,500

lbs. is more than 4,000 lbs.[8]

To draw this inference, many hurdles must be leaped. First of all, the sampling procedures of the pull-tests were completely unknown. Turbine Service picked ten blades to test them. No one else saw them or participated in choosing them, and no other party or representative was present at the test. Testimony at trial indicated that the jaws used in the pull-test to hold the test specimens were probably not properly designed for this type of blade, thereby giving inconclusive results. Furthermore, the fact that ten blades might break at a certain point does not prove that two blades of the remaining ninety would not break at a much lower point. No evidence showing the statistical likelihood of this happening was presented.

Even if all of these hurdles were cleared, there is one remaining fact that has caused me to refuse to draw the inference pressed upon me by repairers. Kugler testified that the LP blades rotating at a high speed were subject to cyclic stresses. These loads may be less than the static loads applied to a part in a pull-test. Nevertheless, par-

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[8] Transcript of May 8, 1978, page 133:

Q: Now if we were to assume that a blade that had been welded was pull-tested and it pulled apart at 9,500 pounds, not pounds per square inch, but at 9,500 pounds, would that be above or below the weighting that you have calculated to apply to that blade under operating conditions with the turbine running at 3,950 rpm's?

A: It would be a greater load. You would have a safety factor of about more than two and one-half.

ticularly when a part has a flaw such as insufficient root penetration, the repeated application of such stresses may be severe enough to cause a fracture. I am convinced by a preponderance of the evidence that that is what happened in this case.

In accident reconstruction cases a court is sometimes fortunate enough to be faced with damage symptoms that allow only one conclusion as to their cause. This case was not so easy. All of the damage that was observed could have been caused according to any one of three separate theories advanced during the litigation. For instance, the groove marks on the inside of one of the spacer rings could have been caused by the piece of broken rotor blade flying around inside the turbine or it could have been caused by expanding rotor parts coming in contact with the out-of-round casing and spacer ring or it could have been caused by a stator blade breaking loose and being dragged across the spacer ring by a moving part. Almost all of the observable evidence was susceptible to reasonable inferential analysis that would lead back to any of the three hypothetical causes of the river trial. The repairers strenuously advocated the distorted casing theory. They contended that the casing was warped before the vessel was put into Todd. Under this theory of causation, none of the repairers would be liable for any damages due to the river trial casualty.

Although I have found that the LP ahead casing as well as the LP astern casing were distorted to some unknown degree before the river trial casualty, I have also

found that the distortion was not the cause of the casualty. I made this finding based upon two considerations. First, the dock trial of May 23 was conducted without any scraping noises originating from the turbine. Gear noise was heard both ahead and astern, but otherwise everything ran smoothly. To be convinced that the distorted casing was the cause of the river trial casualty, I would have to believe that something happened on the river trial that had not happened during the second dock trial. Repairers put forth the hypothesis that the rotor expanded due to increased heat during the river trial and that the expansion caused rotating parts to come in contact with the distorted casing. This appeared to me to be unsupported conjecture. Harrison and Higgins were not of the opinion that the clearances would be reduced due to thermal expansion. McPhate was asked to make a calculation showing the dimensional effects of certrifugal force and thermal expansion. He made an assumption that there was 130°F temperature difference between the rotor and casing. There was no evidence and very little reliable explanation for such an assumption. McPhate was of the opinion that the full thermal expansion did not take place on the dock trials and therefore the rotor did not touch any part of the casing prior to the river trial.[9] Bergeron testified that if

[9] At another point, Turbine Service's expert McPhate seemed to contradict himself on this issue. Testifying in a different context, McPhate seemed to be of the opinion that thermal expansion would not be very significant.

> Q: And, you also indicated in the case of the KATRIN's turbine that it would have also been necessary to re-machine the parting faces.

the casing were out-of-round the problem should have manifested itself at the dock trial. Most persuasive to me, however, was the testimony by several experts that thermal expansion would cause a gradual growth and contact manifesting itself during the river trial by scraping and rubbing noises as the parts began to rub together. The distorted casing hypothesis is generally inconsistent with the three pings preceding rubbing and scraping noise, and I have rejected it as an explanation for the river trial casualty.

Another hypothesis advanced by the repairers was that a stator blade in the 14th row broke loose, became lodged between moving and stationary parts, tore out the Row 14 rotor blades, threw the rotor out-of-round and caused all the subsequent damage. Under this theory it was possible that none of the repairers would be liable since they allegedly were ordered to fair and straighten the stator blades and this caused the fracture. Another possibility, advocated by some of the repairers (but, for obvious reasons, not others) was that the stator blade broke because it had been heated and tapped by Turbine Service personnel at the installation, thereby weakened and made a candidate for fracture. This was the most probable cause of the casualty in McPhate's opinion. Roemer also gave some

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(Footnote 9 continued)

A: Yes, especially since this was a Low Pressure turbine. You know, the cold dimensions as seen in the shop are not going to be really drastically different in the running dimensions.

Transcript, May 8, 1978, Page 97.

credibility to this theory. Most of the owners' expert witnesses agreed that the damage was consistent with this theory. However, Harrison said that he had never seen a stator blade come adrift although he had seen a fairly great number of rotor blades break loose. He was somewhat doubtful about the broken stator blade theory since the stator blades were only subject to steam load whereas the rotor blades were subject to centrifugal force plus bending and flutter. Harvey and Higgins both agreed that you could not completely rule out the theory that a fixed blade had touched the rotor drum and come loose. However, Higgins did not think that the ping sound could have been a stator blade breaking off because it would not be moving at a high velocity like a rotor blade. Weighing all the evidence I also reject this theory as an explanation for the damage caused during the river trial casualty.

One expert, Harvey, was particularly insistent about the fact that accident reconstruction in marine surveying was not an exact science. There are always many possible causes for damages found after a casualty. Indeed, the experts in this case proved this to be true more than once. On many questions of fact, competent and experienced surveyors disagreed. Furthermore, Higgins changed his opinion as to the cause of the warped casing over the course of the litigation, originally believing it was caused by a carryover on January 31, 1975. Two years later, upon hearing new evidence, Higgins changed his mind and expressed the opinion that the distorted casing was caused by repair personnel heating it with torches. McPhate's first

opinion expressed in May of 1975 was that the most likely cause of the river casualty was a distorted casing. Two years later, upon discovering new evidence, McPhate changed his mind and decided that the most likely cause was that one of the stator blades broke off. Unfortunately, I cannot wait two years for further evidence nor was the jury of nine experts able to come to a unanimous conclusion to help me out of my dilemma. Further, I have not been able to stand the three theories beside one another to see which received a plurality of votes in its favor. The burden of proof on owners requires that one theory be supported by a majority of evidence. I have found that the rotor blade weld-failure theory is more likely true than not true.

WHAT LAW APPLIES

[2,3] Maritime law applies in this case. A tort is deemed to have occurred not where the wrongful act or omission had its inception but where the impact of the act or omission produces injury. For this reason, an injury occurring on the navigable waters of the United States due to defective repairs which took place on land still falls within admiralty jurisdiction. *Jig The Third Corp. v. Puritan Marine Insurance Underwriters Corp.*, 519 F.2d 171 (5th Cir. 1975); *Roberts v. United States*, 498 F.2d 520 (9th Cir. 1974), *cert. denied*, 419 U.S. 1070, 95 S.Ct. 656, 42 L.Ed.2d 665 (1974); *Dudley v. Bayou Fabricators, Inc.*, 330 F.Supp. 788 (S.D.Ala.1971).

[4] A contract to make repairs to equipment aboard a vessel in navigation is a maritime contract. It is also clear that a contract to furnish supplies or accessories to a vessel is maritime in nature, the locality of performance not being determinative. *Houston-New Orleans, Inc. v. Page Engineering Co.*, 353 F.Supp. 890, 898-99 (E.D.La.1972) (Rubin, J.).[10]

NEGLIGENCE OF TODD

Todd has denied that it was negligent. In its brief it states that "[t]he only negligence that could possibly be charged to [it] is its alleged failure to observe the design changes." Among other things, it is apparently referring to the welding of new airfoils to old roots when it mentions "design changes." It argues that it is normal practice in a shipyard that "a part sent out of the shipyard to an independent contractor and specialist for repairs is not examined upon its return, but the part is reinstalled and if found satisfactory upon testing is passed by the yard and owner's representative. No supervision of an independent contractor is contemplated by the parties."

This proposition is apparently based on the oft-stated maxim that an employer of an independent contractor has no vicarious responsibility for the contractor's torts. Prosser on Torts 480-91 (3d ed. 1964). If so, Todd has

[10] Judge Rubin's opinion in the above case covers many of the same issues and facts before me now and deserves careful reading.

misapprehended its own position in the chain of events.[11]

[5-8] The only conduct that was required of Todd in this situation was reasonable care. A discussion of the standard of reasonable care in a similar case can be found in *Noel v. United Aircraft Corp.*, 219 F.Supp. 556, 566-68 (D.Del.1963). *See also* Restatement (Second) of Torts § 291 (1965). The amount of care which a reasonable man must take increases with the foreseeable risk involved to others. Todd's duties in this case were very similar to those of a manufacturer or an assembler who uses component parts in the final product. A repairer is generally subject to the same liability as that imposed upon a manufacturer. Restatement (Second) of Torts § 404 (1965). Such manufacturers have a duty to exercise reasonable skill and care in the design and manufacture of their products, commensurate with the risk of harm flowing from normal use of that product. This duty also binds the manufacturer with respect to component parts incorporated into its final product but manufactured by another. A manufacturer thus has an affirmative duty to make such tests and inspections, during and after the process of manufacture, which are commensurate with the dangers involved in the intended

[11] Owners have contended that Todd was independently negligent by not exercising reasonable care in selecting a competent, experienced and careful contractor. Owners have also claimed that Todd knew that it did not have the men and shop capacity to do the turbine repair job but nevertheless held itself out as capable of doing the job and accepted the work on that basis. This might leave Todd open to vicarious liability for Turbine Services' negligence under the principles stated in the Restatement. Restatement (Second) of Torts §§ 400, 429 (1965). I do not find it necessary to reach these contentions since Todd is liable on other grounds.

use of the product. *Nicklaus v. Hughes Tool Co.*, 417 F.2d 983, 986 (8th Cir. 1960). In the *Sieracki* case the trial judge found that certain tests which could have been made to the defective part in question were not made. Failing to make these tests was conduct that fell below the level of "reasonable care." *Sieracki v. Seas Shipping Co.*, 149 F.2d 98, 100 (3rd Cir. 1945). Todd's negligence need not have changed the condition of the turbine for the worse. It is enough that the turbine did not leave Todd's hands "in that safe condition in which a competent contractor would have put it and that it [was] used in reliance upon the care and competence" of Todd. Restatement (Second) of Torts § 404, Comment b (1965).

It is not necessary that the part in question be "inherently dangerous." It is not necessary that the risk be a great one or that it be a risk of death or serious bodily harm. A risk of harm to property is enough. All that is necessary is that the risk be an unreasonable one. Restatement (Second) of Torts § 395, Comment d (1965).

[9] I find as a matter of law that the standard of conduct which applies to a shipyard conducting a major repair job on the main propulsion unit of a large vessel requires at least two things that Todd did not do. A shipyard must: 1) find out at least the broad outlines of the steps planned by a subcontractor and 2) inspect the finished repairs at least closely enough to be able to determine whether or not substandard repairs have been made or idiosyncratic design changes have been employed.

The magnitude of the risk in this case was high. Risk is a product of two factors: the probability of loss and the magnitude of that loss if it occurs. The probability that a subcontractor such as Turbine Service may conceive of an improper repair method and carry it out may be a debatable matter, but testimony made it plain that it was by no means so low as to be disregarded. The magnitude of the potential loss, however, was undebatably great. When a vessel is delayed in port because of improper repair, tremendous costs are incurred. Faulty repairs on a turbine whose blade tips are moving at a speed of nearly 500 mph may well cause enormous damage to machinery and engine room personnel. Worst of all, faulty repairs on the KATRIN's turbines could have left the vessel without any source of power in the middle of the Mississippi River, causing a tragedy similar to others in this port's recent history.

When the foreseeable risk involved to others is this great, the amount of care which a reasonable man must take is very high indeed. It is certainly high enough to require the two steps that I have described above. I am reinforced in this opinion by the testimony of the many experts including Todd's Assistant General Manager Bergeron. He felt, at least after the fact, a clear responsibility for the events leading to the casualty.[12]

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[12] In doing so, he was not the only witness who exhibited how differently engineers and attorneys look at the concepts of fault. Technical witnesses, dealing in uncertainties and statistical probabilities, seemed at times to reflect a completely different view of responsibility from that which attorneys are accustomed to. On numerous occasions witnesses testified that the conduct they would expect of themselves and their col-

Todd's counsel elicited testimony on several occasions to the effect that the work of subcontractors on electric motors and other such items was never inspected. They were merely put back into the ship and put in service. If the part did not work, it was returned to the subcontractor or repaired in some other fashion. Such an approach may be conscionable for parts such as electric motors. "The character of harm likely to result from the failure to exercise care in manufacture affects the question as to what is reasonable care. It is reasonable to require those who make or assemble automobiles to subject the raw material, or parts, procured from even reputable manufacturers, to inspections and tests which it would be obviously unreasonable to require of a product which, although defective, is unlikely to cause more than some comparatively slight, though still substantial, harm to those who use it." Restatement (Second) of Torts § 395, Comment e (1965). The object in question here was not so small or insignificant as an electric motor, and the character of harm that would be likely to result from the failure of care was not so minimal.

[10] There is no evidence that Todd did anything at all to inform themselves as to the repair methods or materials that Turbine Service was using. Although Ault

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(Footnote 12 continued)
leagues was very special care indeed, much higher than the strictly limited levels of responsibility imposed by the law. In short, whereas this court and counsel might frequently have felt that an actor should not be expected to do anything more than the minimum required to avoid liability, it was clear that the internalized ethics of the ship repair profession would require much more. *See* 1 L. Frumer & M. Friedman, Products Liability § 6.02[1] (1978).

was the "ship's superintendent" on this job, he was supervising Turbine Service "in a roundabout way." Since the job had been subcontracted, Sheridan "was supervising himself really." Neither Ault nor Bergeron nor any other Todd personnel seemed to know where Sheridan had procured new blades or anything else about how the job was being done. No Todd personnel bothered to look closely at the completed rotors or even had sufficient interest in the outcome of the job to recognize that spacer rings and shrouding had been added to the LP turbine, two things that would certainly have given them pause for thought if they had been prone to take such pause. I find that the lackadaisical attitude demonstrated by Todd personnel toward the subcontract for the repair of the LP turbine was below the standard of care that a reasonable person in the same position would take and that such action or lack of action constituted a negligent act on the part of Todd.

[11,12] An essential element of a cause of action for negligence is that there be some reasonable connection between the act or omission of the defendant and the damage which a plaintiff has suffered. Causation in fact must be found before a party can be held liable, but that term includes all conduct which has contributed to the damage and without which it would not have occurred. The term covers a defendant's omissions as well as his acts. "The failure to extinguish a fire may be quite as important in causing the destruction of a building as setting it in the first place." Prosser, Law of Torts 237-38 (4th ed. 1971).

[13] It is not necessary for me to review the volumes of accumulated learning on causation in fact and its analytical sibling, proximate cause. Suffice it to say that the Restatement of Torts expresses most of the pertinent considerations in Sections 431 and 435. The Restatement accepts the "substantial factor" test in determining whether an actor's negligent conduct is a legal cause. I have no difficulty finding that Todd's failure to conduct themselves according to the standards I have outlined above was the legal cause of the damages suffered during the river trial casualty. If Todd had lifted a hand to determine what was happening in the major repair job they had contracted to take, the harm that was sustained would have been avoided.

[14] Even though Todd's conduct may have been a substantial factor in bringing about the river trial damages, they may be relieved of liability if it appears to a factfinder highly extraordinary that such conduct should have brought about the harm. This is the normal test of foreseeability applied in negligence analysis. I find that Todd should have realized that complete abdication of responsibility to a subcontractor on a major turbine reblading job might cause harm in substantially the manner in which it was in fact brought about. There is nothing highly extraordinary about what happened as a result of Todd's negligent act, and Todd cannot therefore be relieved of liability for lack of proximate causation. Restatement (Second) of Torts § 435 (1965).

NEGLIGENCE OF TURBINE SERVICE

[15,16] The general principles developed above for the standards of conduct to be applied to any actor are similarly applicable in an analysis of the liability of Turbine Service. However, those very general principles are supplemented by somewhat more finely calibrated measuring rules in Turbine Service's case. A repairer has a duty to exercise reasonable skill and care in the design and repair of the object to be repaired, commensurate with the risk of harm flowing from normal use of that product. Restatement (Second) of Torts § 404 (1965); *Nicklaus v. Hughes Tool Co.*, 417 F.2d 983, 986 (8th Cir. 1969). Reasonable skill and care in Sheridan's case meant the skill and knowledge normally possessed by members of his profession. Restatement (Second) of Torts § 299A (1965). Having undertaken to render services in the trade of a turbine technician, he was required to exercise certain skills and knowledge above that possessed by the general public.

[17] I find that Turbine Service was negligent because Sheridan conducted himself with less skill and knowledge normally possessed by members of his profession or trade during the repair of the LP turbine. First of all, it was uncontroverted that welding airfoils to old blade roots in this type of turbine was never done. Experts on both sides testified to that effect.[13] The essence of the negligent act was conceiving of a design or plan that would

[13] Roemer did say, however, that sometimes blades were welded in gas turbines using modern, sophisticated technology. This was not a gas turbine, nor was the technology modern or sophisticated.

be universally condemned in the trade.

[18, 19] The damaging effect of such a plan was compounded by other acts of negligence. I find that Sheridan's failure to consult with a welding engineer to determine a proper welding procedure or method or his failure to insist that Gonzales do so was also conduct below the normal skill and knowledge expected of his trade. Finally, I find that the failure to make any calculations or conduct any destructive or nondestructive testing on the fabricated blades to determine whether or not they would stand up in service was also below the standard of conduct expected of him. The only test carried out by Sheridan and Turbine Service was to "beat and hammer on [the blades] with a hammer." From the testimony of the many turbine specialists who testified during the trial, I am convinced that the conduct of Turbine Service in this matter fell far short of the standard expected of such specialists within and without that profession.

[20] The standards and principles discussed above for legal cause and proximate cause apply equally in the case of Turbine Service. Turbine Service's conduct was a substantial factor in bringing about the harm that ultimately occurred. Sheridan was the managing and driving force behind the repair job. His conduct was a legal cause of the damages resulting from the river trial. It was also a proximate cause since the damages that flowed from his conduct were foreseeable and not extraordinary.

[21,22] Turbine Service could be released from liability if there was an intervening act of Todd, such as Todd's failure to adequately supervise or inspect the work being performed, that rose to the status of a superceding cause. I reject that contention, because the failure of Todd to adequately inspect was a foreseeable risk of Turbine Service's negligence. A repairer or manufacturer is subject to liability even though a dangerous condition is discoverable by an inspection which a party in Todd's position would be under a duty to make. Restatements (Second) of Torts § 396 (1965); *Fredericks v. American Export Lines*, 227 F.2d 450, 453-54 (2d Cir. 1955), *cert. denied*, 350 U.S. 989, 76 S.Ct. 475, 100 L.Ed. 855 (1956). Sheridan knew from the way Todd was dealing with the repairs that he was not being closely supervised or inspected. It was foreseeable that Todd might fail to test or detect any errors Turbine Service made. For these reasons, Turbine Service is liable to the shipowners for the damages suffered on the river trial casualty due to their negligence.

NEGLIGENCE OF GONZALES

[23,24] The principles of negligence applied to Turbine Service are equally applicable to Gonzales. One who undertakes repairs has a duty arising in tort to do them without negligence. *Southwest Forest Industries, Inc. v. Westinghouse Electric Corp.*, 422 F.2d 1013, 1020 (9th Cir. 1970), *cert. denied*, 400 U.S. 902, 91 S.Ct. 138, 27 L.Ed.2d 138 (1970). I have discussed above the formula for determining how high the risk is in any given situation. This

high degree of risk required a very high standard of care by Gonzales. Gonzales was aware of the fact that the repair was being made on a major propulsion unit of an ocean-going vessel. This high standard of conduct is more precisely defined because Gonzales, like Turbine Service, was required to perform with a certain skill and knowledge prevalent in its profession or trade. A person who undertakes to manufacture an instrumentality for use by others will be held to an expert's knowledge of the arts, materials and processes relating to his product. *Pipe Welding Supply Co. v. Gas Atmospheres, Inc.*, 201 F.Supp. 191, 200 (N.D. Ohio 1961). Because Gonzales undertook to render services as a welder of turbine blades, they were required to exercise the skill and knowledge commonly possessed by welders. Restatement (Second) of Torts § 299A (1965).

[25] I find that the standard of care required of Gonzales was that: 1) before welding two parts to be used on a steam turbine it satisfy itself by independent inquiry or investigation that the plan or design was reasonable; 2) even if it had ascertained that such a plan was reasonable, it complete the welds in a manner that would reasonably insure that the blades would hold up in service; 3) it ascertain with reasonable certainty the metallic composition of the parts to be welded; 4) it choose a proper rod with which to weld the metal pieces; 5) it pre-heat, post-heat and stress-relieve the materials used; and 6) it perform or commission tests or otherwise assure itself with reasonable certainty that tests have been performed to insure that the welds will hold up under normal operating conditions. *McKee v.*

Brunswick Corporation, 354 F.2d 577, 578 (7th Cir. 1965).

Gonzales did not inquire into the feasibility or propriety of welding new airfoils to old roots on a steam turbine rotor. It did not try to determine whether or not two fillet welds and two fusion passes were proper welds under the circumstances. The low standard of conduct manifested by Gonzales in failing to determine what the metals were before welding was amply demonstrated by testimony of several witnesses. The choice of a welding rod was made in a similarly careless manner. Gonzales did not know the materials were 410 stainless steel, but was under the impression that the parts were made of different metals. Thereafter, the welder looked in a manual in the shop and determined that a 309 stainless rod was recommended. Gonzales didn't have one, so they used a 308 rod since "that was very close."

At least two experts testified that a welding "procedure" should have been developed for this particular job. A welding procedure is a description of the weld preparation, jigging procedure, current settings, filler rod, number and type of passes and the pre-treatment and post-treatment to be used on the job. Gonzales did not adopt or even consider a welding procedure.

The evidence established that if a weld of this nature is carried out, it should be a "full penetration" weld, that is, there should be 100% metal-to-metal contact between the two pieces with no discontinuities across the cross-

sectional area. Since Gonzales had undertaken to weld parts of this type, they should have known that anything less than a full-penetration weld would be substandard work. They should also have known that welding on the metals involved could only be properly conducted with pre-heat, post-heat and stress-relief treatment.

[26,27] Gonzales argued vehemently and at length that it was not legally required to meet these standards of conduct. It contended that since Gonzales did not devise the method of repair, and since it welded according to specific instructions and directions given by Sheridan, and since it had no facilities to test the blades and was not expected to guarantee that the method of repair would function under operating conditions in the turbine, it could not be found at fault. In fact, "[it could not] be blamed for a result which did not come up to manufacturer's standard." I reject this contention. A repairer must have more responsibility than merely following orders. When a job is given to a craftsman such as a welder, it can be expected that he will accomplish the task so that there is a reasonable certainty that the part will perform properly under operating conditions. It is not enough to attach the two parts together so that they do not come apart when held in the hand or when beaten with a hammer. It is also not enough to gauge one's own conduct as a technician and machinist solely by what a customer orders done. This is particularly true when the customer ordering the work is not a welding expert. The welding in this case should have been performed according to the standards I have described above. The

fact that it was not constitutes negligence.

[28,29] Gonzales' assertions of lack of liability could also be a claim that its negligent act was not the proximate cause of the damage because the conduct of Turbine Service was a superceding cause. Restatement (Second) of Torts § 431 (1965). It urged this argument with particular force based on its allegations that Sheridan told it that the blades were satisfactory and had been or would be tested. An intervening act by a third person, even if negligent, relieves the original negligent party from liability only if the subsequent wrongdoer's act could not have been anticipated by the first party. [*See generally* Restatement (Second) of Torts § 447 (1965) and *Moyer v. Martin Marietta Corp.*, 481 F.2d 585, 591 (5th Cir. 1973)]. I have already discussed above how the duty to test or inspect possessed by an actor subsequent to the original actor in the chain of causation does not relieve the original actor of negligence. Sheridan's intervening conduct and omissions cannot relieve Gonzales from liability nor can Todd's, since the conduct of both parties was foreseeable to Gonzales. The original negligence of Gonzales in defectively welding blades was like a time bomb aimed at the KATRIN. The fact that Turbine Service or Todd did not defuse it before it caused any harm was not a highly extraordinary event or one outside the range of normal foreseeability. A manufacturing shop which is called upon to render certain services cannot perform the work and then hope someone further down the line will catch any errors they might have made when the consequences of such a careless attitude are so

grave. I find that the negligence of Turbine Service and Todd subsequent to Gonzales' work was foreseeable and not a superceding cause. Therefore, I also find that Gonzales' negligence was a proximate cause of the river trial damages.

CONTRIBUTORY NEGLIGENCE OF OWNERS

The repairers have contended that the owners of the KATRIN were also negligent and that, therefore, recovery should either be denied or reduced. Whether we call this allegation one of contributory negligence or some other term is unimportant at this point. Essentially, the repairers are saying that the owners' conduct contributed as a legal cause to the harm they suffered and fell below the standard to which they were required to conform for their own protection. Restatement (Second) of Torts § 463 (1965).

[30] Owners' conduct was allegedly deficient in two ways. First, repairers contend that Manellis conceived or at least approved the idea of welding new airfoils to old blades before he left New Orleans or that he took the idea with him back to Greece and explained it to Palios. Thus, when Diana telexed approval for permanent repairs, it is contended that it was implicit that Diana was approving of a welding plan that had been fully discussed. I have rejected the contention that it was Manellis' idea to weld airfoils to the roots, that he discussed it with Palios or that Palios knew of the plan. The only direct evidence that Ma-

nellis knew of the proposed welding was provided by Sheridan's testimony and I have found that not to be credible.

[31] The second series of allegations focuses on whether the second owners' representative, Tsaknaris, authorized or approved the welded blades. As I have already found, Tsaknaris was not an experienced steam turbine man and his command of the English language was minimal. There was no credible evidence that Tsaknaris knew the blades were being welded or saw the blades when he observed the rotor.

[32] The only question left is whether or not owners were under some duty to inspect for and find defects in design and repair such as welded blades. In what is probably the most obscure and least cited portion of the *Sieracki* opinion, the court was faced with a very similar problem. A longshoreman was injured when the shackle of a boom broke and injured him. He argued, as to repairers in this case, that the shipowner was liable based on negligence. The court disagreed.

> The Seas Shipping Co. is not guilty of negligence, therefore, unless it failed to use due care to discover the defect in this shackle. It could not have found it by visual inspection. Doubtless it could have been discovered had the owner torn down the various pieces of apparatus on the ship and subjected them to the sound test or the x-ray test or any other test which might have disclosed the defect. We do not think that reasonable care required such effort on the part of

> the owner. The master of the ship was present when the lifting test was made. The owner purchased the ship from the Maritime Commission which, in turn, had contracted for its construction with a reputable manufacturer. We do not think the buyer, under these circumstances, is required to tear down the thing bought and subject it to independent tests in order to be exercising due care.

Sieracki, 149 F.2d at 101. I find that the standard of due care did not require the vessel owner to inspect renewed blades in the LP turbine rotor to insure themselves that the blades were not welded or otherwise defective.

CONTRACTS BETWEEN OWNERS AND TODD, TODD AND TURBINE SERVICE, AND OWNERS AND TURBINE SERVICE

It is difficult to find a document or series of documents that expresses the entire contract between owners and Todd. O'Brien testified that there were several methods of contracting between an owner and a shipyard. Sometimes an owner prepares specifications for a bid and gives it to the shipyard. The shipyard then returns the bid and owner gives the contract on the basis of the bid he receives. A second method is to put the work in hand on a "time and material basis" with a base rate per hour or pound. After the work is done, a total price is calculated. Harvey testified that an original field survey is sometimes used as a broad outline to set the repair process in motion. Once that has happened, decisions are made on an *ad hoc*

basis, owners and repairers relying to a great extent upon the good faith traditions of the industry. It appeared that the contract process between Todd and the owners was a combination of these and several other methods. However, certain specific documents and decisions are informative as to the details of the contract.

The original contract negotiations began between Todd and Manellis on February 12, 1975. Sometime in early March owners decided to make permanent repairs on the KATRIN's LP turbine, but the actual details of how this was to be done and what price was to be charged were left until the March 20, 1975 telex from Todd to Diana. The original field survey may have set the repair process in motion and provided a broad guideline as to what was to be done, but it was not the final expression of the contract.

[33] Probably the best objective expression of the contract between Todd and owners is the final price negotiation sessions between Van Rynbach, Harvey and Coleman in mid-May. Although this was written *after* the repairs were completed and everyone knew what had been done, that negotiated agreement plus a list of ten extra items for which owners were to submit separate invoices clearly delineates the parties' contract for the repair work.

[34] A letter dated March 4, 1975 is a proposal by Turbine Service to accomplish certain tasks on the KATRIN's turbines. Although this letter was written sometime between March 17 and March 20, it was back-

dated to March 4. On March 21, 1975 two purchase orders were written by Todd to Turbine Service to confirm an earlier telephone confirmation that Turbine Service was to conduct the work. I find that the letter and purchase orders constitute the contract between Todd and Turbine Service.

No serious contention was made at trial that a contract existed between owners and Turbine Service. I find that there was none.

CONTRACTS BETWEEN GONZALES AND OTHER PARTIES

Gonzales contends that no contract existed between Gonzales and Turbine Service. They remind me that no purchase order existed for the work Gonzales did and that the only documents pertaining to the job were the final bill submitted by Gonzales for the work performed and the written release from liability which Gonzales obtained from Turbine Service after the work was completed. Because the arrangement was verbal and there was an unspecified amount of work to be done rather than a fixed task to be accomplished, because there was no specified contractual term for completion of the job and because ultimate control over the details of the work and method of performance were under Sheridan, Gonzales argues that there was no contract at all between the two parties.

[35] The lack of any writing is not dispositive in

maritime contracts. Oral contracts are generally regarded as valid by maritime law. *Kossick v. United Fruit Co.*, 365 U.S. 731, 81 S.Ct. 886, 6 L.Ed.2d 56, *reh. denied*, 366 U.S. 941, 81 S.Ct. 1657, 6 L.Ed.2d 852 (1961).

Hoover of Gonzales was the principal contact man with Sheridan. On March 21, 1975, one lot of turbine blades was sent from Turbine Service to Gonzales to be modified and repaired. Testimony as to the pricing arrangement between Gonzales and Turbine Service was extremely vague. It appears that Gonzales gave an original figure of $43,800, which included work on other parts of the turbine as well. Hoover testified that later "it got hectic" and the price method was changed.

[36] Regardless of the pricing agreement, it is apparent that Sheridan and Hoover agreed that Sheridan would send old roots and new airfoils to Gonzales to be welded and that Gonzales would do the welding as soon as possible. Toward the end, ten or twelve blades were being welded and redelivered three or four times a day.

These negotiations have all the earmarks of an oral contract. Sheridan said he planned to bring the blades of the KATRIN's LP rotor to Gonzales to be welded, and Gonzales declared its readiness to weld the blades. The two parties agreed upon a price that Turbine Service would pay Gonzales in return for its services. In technical terms, Gonzales made an *offer* to Turbine Service to perform certain services for a price which was *accepted* by Turbine

Service each and every time a lot of blades was brought to Gonzales to be welded. The agreement was supported by *consideration*, which was the amount Turbine Service was to pay. On any given occasion, had Gonzales failed to weld the blades that Turbine Service brought to it and had this resulted in some damage to Turbine Service, Gonzales would have been liable to Turbine Service for breach of contract. As explained in a leading treatise on contracts:

> In what purports to be a bilateral contract, one party sometimes promises to supply another, on specified terms, with all the goods or services that the other may order from time to time within a stated period. A mere statement by the other party that he assents to this, or "accepts" it, is not a promise to order any goods or to pay anything. There is no consideration of any sort for the seller's promise; and he is not bound by it. This remains true, even though the parties think that a contract has been made and expressly label their agreement a "contract." In cases like this, there may be no good reason for implying any kind of promise by the offeree. Indeed, the proposal and promise of the seller has the form of an invitation for order; and the mode of making an operative acceptance is to send in an order for a specific amount. By such an order, if there has been no previous notice of revocation, a contract is consummated binding both parties. [footnotes omitted]

1A Corbin on Contracts 157 (1963): *See also Willard, Sutherland and Co. v. United States*, 262 U.S. 489, 43 S.Ct. 592, 67 L.Ed. 1086 (1923).

[37,38] I find that there was a valid and enforceable contract or series of contracts between Turbine Service and Gonzales. The terms of the contract(s) included Gonzales' promise to weld turbine blades to blade roots for a certain agreed-upon, if fluctuating, price.[14]

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[14] Much has been made of the issue of whether or not Gonzales was an "independent contractor." I think a decision on this issue is of no help in deciding the case. Generally, whether or not a person is an "independent contractor" is dispositive in determining a master's vicarious tort liability or whether or not a party is liable under various types of social legislation such as the Longshoremen's and Harbor Workers' Compensation Act or other workmen's compensation.

Furthermore, even if the issue were relevant to a decision in this case, I find that Gonzales was an independent contractor. Various indicia point to such a finding. First of all, I am not convinced that the degree of control exercised by Sheridan over the welding was as great as Gonzales contends. Certainly Sheridan ordered the welding, just as any customer orders that certain work be done; however, he knew nothing about welding; did not pick the rod; did not specify the type of jig to be used; and did not specify what type weld was to be used initially in the test samples to attach the two parts to one another. He did not stand by as the welders were doing their work, nor is there any evidence that he carefully checked the work after it was done. In fact, Sheridan instructed Gonzales as to the welding in only two ways. First, he told them he wanted some sample blades welded however they could do it. After that was done to his satisfaction, he told Gonzales to do the rest of the blades exactly as they had done the first ones. The only other instruction he gave regarding the welding was when he wanted each lot of blades returned to him after the work was done.

Other indicia looked to for an "independent contractor" determination include the place of work, the time of employment, the method of payment, the right of summary discharge of employees, the nature of the business or occupation and which party furnishes the instrumentalities or tools. *See* 41 Am.Jur.2d *Independent Contractors* §§ 5-23 (1968). Gonzales had control of the premises where the work was performed and they employed, paid and had full power to control the workmen doing the welding. Gonzales furnished the workmen, material, tools, equipment and everything else needed for the welding. Gonzales agreed to do the work either for a specific sum, with reference to the quantity of work they performed, or on a cost-plus basis. Either of these pricing methods tends to show that Gonzales was an independent contractor. The fact that Gonzales was doing work that required special

[39] Although there was a contract between Gonzales and Turbine Service, I find that there was no contract between Todd and Gonzales. Bergeron, Todd's assistant general manager, said that he first found out about Gonzales after the river trial casualty. He had nothing to do with any dealings between Turbine Service and Gonzales, and to his knowledge neither did anyone else at Todd. It made no direct payments to Gonzales, and Todd's ship's superintendent said that he knew nothing of Gonzales until after the river trial.

OBLIGATION OF DILIGENT PERFORMANCE

[40] I have found all of the repairers negligent as to shipowners. There is another basis of liability as well. The legal theories of strict liability in tort, applied on land, are gathering adherents in admiralty at an accelerating pace. Although this circuit has not specifically decided that such theories apply in admiralty[15] numerous other courts have adopted and developed them.[16] One of the latest and best

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(Footnote 14 continued)
skill for its proper performance tends to show that the relation between Turbine Service and Gonzales was not that of master and servant. Finally, Gonzales had the right to choose its own employees and servants to carry on the work, being responsible only to Turbine Service to produce the welded blades, according to the contract. *See* 2 F. Harper and F. James, The Law of Torts 26.11 (1956).

[15] *Higginbotham v. Mobil Oil Corp.*, 545 F.2d 422, 426 n.5 (5th Cir. 1977), *rev'd on other grounds*, 436 U.S. 618, 98 S.Ct. 2010, 56 L.Ed.2d 581 (1978); *Williams v. Brasea, Inc., Vessel Ciapesc I*, 497 F.2d 67, 78 (5th Cir. 1974).

[16] *Pan-Alaska Fisheries, Inc. v. Marine Construction and Design Co.*, 565 F.2d 1129, 1134 (9th Cir. 1977); *Lindsay v. McDonnell Douglas*

descriptions of the impact of such theories on admiralty is discussed in *Pan-Alaska Fisheries, Inc. v. Marine Construction and Design Company*, 565 F.2d 1129, 1134-36 (9th Cir. 1977). Section 402A of the Restatement (Second) of Torts is the best and most widely-accepted expression of the theory of strict products liability. Under that theory, anyone who sells any product in a defective condition unreasonably dangerous to the user or his property is subject to liability for physical harm if the seller is engaged in the business of selling such a product and it is expected to and does reach the user or consumer without substantial change in the condition in which it is sold. That rule applies even though a seller has exercised all possible care in the preparation and sale of the product and even though the user did not buy the product from or enter into any contractual relationship with the seller. The term "sell" is merely descriptive, and a product is considered "sold" if it has been placed in the stream of commerce by any means. *Pan-Alaska Fisheries, Inc.*, 565 F.2d at 1135; *Delaney v. Towmotor Corp.*, 339 F.2d 4, 6 (2nd Cir. 1964); *Greeno v. Clark Equipment Co.*, 237 F.Supp. 427, 433 (N.D.Ind.1965). The movement by courts to adopt strict liability principles into admiralty has been motivated by their beliefs that

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(Footnote 16 continued)
Aircraft Corp., 460 F.2d 631, 635 (8th Cir. 1972); *Sanderlin v. Old Dominion Stevedoring Corp.*, 385 F.2d 79, 81 (4th Cir. 1967); *Boncich v. M. P. Howlett, Inc.*, 421 F.Supp. 1300, 1304 (E.D.N.Y.1976); *Houston-New Orleans, Inc. v. Page Engineering Co.*, 353 F.Supp. 890, 899 (E.D.La. 1972); *Sears, Roebuck & Co. v. American President Lines, Ltd.*, 345 F.Supp. 395, 402 (N.D.Cal.1971); *Ohio Barge Line, Inc. v. Dravo Corp.*, 326 F.Supp. 863, 865 (W.D.Pa.1971); *In re Marine Sulphur Transport Corp.*, 312 F.Supp. 1081, 1102 (S.D.N.Y.1970); *Soileau v. Nicklos Drilling Co.*, 302 F.Supp. 119, 127 (W.D.La.1969).

admiralty may look to and adopt land-based principles that have gained wide acceptance.[17] I do not here incorporate the law of strict liability in tort. Although I am convinced that it would be consonant with the prevalent currents of maritime law, it is not necessary to go so far in this case. However, many of my conclusions are colored and informed by the burgeoning law of strict products liability.

[41] I find that one who enters a maritime contract for repairs or other services impliedly agrees to perform in a diligent and workmanlike manner.[18] This obligation does not require that there be privity between the party who owes the obligation and the one to whom it is owed.

[42] This obligation of diligent performance resembles the warranty of workmanlike performance (WWP) that sprang into being in the *Ryan* case. *Ryan*

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[17] *Lindsay v. McDonnell Douglas Aircraft Corp.*, 460 F.2d 631, 637 (8th Cir. 1972); *Schaeffer v. Michigan-Ohio Navigation Co.*, 416 F.2d 217, 221 (6th Cir. 1969); *Sieracki v. Seas Shipping Co.*, 149 F.2d 98, 99-100 (3rd Cir. 1945); *Houston-New Orleans, Inc. v. Page Engineering Co.*, 353 F.Supp. 890, 899 (E.D.La.1972); *In re Alamo Chemical Transportation Co.*, 320 F.Supp. 631, 639 (S.D.Tex.1970); *Soileau v. Nicklos Drilling Co.*, 302 F.Supp. 119, 127 (W.D.La.1969).

[18] "[I]n our view *Ryan*, by necessary implication, confirmed the applicability to maritime service contracts of the hornbook rule of contract law that one who contracts to provide services impliedly agrees to perform in a diligent and workmanlike manner. 9 S. Williston, Contracts § 1012C, at 38-39 (3d ed. Jaeger 1967). This obligation has been implied in contracts ranging from an ordinary construction contract, *Henggeler v. Jindra*, 191 Neb. 317, 214 N.W.2d 925 (1974), to a contract to install plumbing, *In re Estate of Talbott*, 184 Kan. 501, 337 P.2d 986 (1959), to a contract to tan goat skins, *William Beaden Kopf Co. v. Henwood & Nowak, Inc.*, 14 F.2d 125 (D.Mass.1926), and there is no reason why it should not be implied in maritime service contracts as well." *Fairmont Ship. Corp. v. Chevron Int. Oil, Inc.*, 511 F.2d 1252, 1259 (2d Cir. 1975).

Stevedoring Co., Inc. v. Pan-Atlantic S.S. Corp., 350 U.S. 124, 76 S.Ct. 232, 100 L.Ed. 133 (1956); *see Fairmont Ship Corp. v. Chevron International Oil Co., Inc.*, 511 F.2d 1252, 1255-61 (2nd Cir. 1975). In the last two decades, the stream of cases applying the WWP has broadened the narrow bed of policy out of which *Ryan* flowed.

Warranties of workmanlike performance are not limited to cases involving personal injuries[19] nor those involving stevedoring services, having been applied to contracts for ship's services other than stevedoring services, including agreements to make ship repairs.[20] Courts have applied the warranty without a contract between stevedore and vessel owner. *Waterman S.S. Corp. v. Dugan and McNamara, Inc.*, 364 U.S. 421, 422, 81 S.Ct. 200, 5 L.Ed.2d 169 (1960); *Crumady v. The Joachim Hendrick Fisser*, 358 U.S. 423, 428, 79 S.Ct. 445, 3 L.Ed.2d 413 (1959). Subcontractors also owe a WWP to the vessel owner whether they have contracted with him or not. *United States v. San Francisco Elevator Co.*, 512 F.2d 23, 28 (9th Cir. 1975). *Ryan* held that a stevedore's implied WWP was compar-

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[19] *See Interstate Steel Corp. v. S.S. "Crystal Gem"*, 317 F.Supp. 112, 120 (S.D.N.Y.1970); *Alcoa Steamship Company v. Charles Ferran & Company*, 242 F.Supp. 962, 973 (E.D.La.1965); *Hershey Chocolate Corp. v. The S.S. Robert Luckenbach*, 184 F.Supp. 134, 140 (D.Ore.1960), *aff'd, Albina Engine & Machine Works, Inc. v. Hershey Chocolate Corp.*, 295 F.2d 619 (9th Cir. 1961).

[20] *United New York Sandy Hook Pilot's Ass'n v. Rodermond Industries, Inc.*, 394 F.2d 65, 71 (3rd Cir. 1968); *Lusich v. Bloomfield S.S. Co.*, 355 F.2d 770, 776 (5th Cir. 1966); *American Export Lines v. Norfolk Shipbuilding and Drydock Corp.*, 336 F.2d 525 (4th Cir. 1964); *Booth S.S. Co. v. Meier & Oelhalf Co.*, 262 F.2d 310 (2d Cir. 1958); *Smith v. Brown & Root Maine Operators*, 234 F.Supp. 130 (W.D.La.1965), *aff'd*, 376 F.2d 852 (5th Cir. 1967).

able to that of a manufacturer who impliedly guarantees the fitness of his product for normal use. 350 U.S. at 133-34, 76 S.Ct. 232. The consequences of that holding are powerful, since a guarantee of the fitness of a product extends to all foreseeable victims of a breach. *MacPherson v. Buick Motor Co.*, 217 N.Y. 382, 111 N.E 1050 (1916). The zone of liability is commensurate with the zone of foreseeable risk. *Sills v. Massey-Ferguson, Inc.*, 296 F.Supp. 776, 782 (N.D.Ind.1969).

[43,44] It is the general rule that a retailer or other seller suffering a judgment against him by an injured person in a warranty action is entitled to indemnity from a manufacturer who sold the product to him with a similar warranty. 3 L. Frumer & M. Friedman, Products Liability § 44.03[1] n.1. Turbine Service purchased new airfoils and contracted to have them cut and welded onto old roots, certainly a manufacturing process. Gonzales (which includes the word "Manufacturing" in its firm name) also was a manufacturer of blades.

An implied obligation of diligent performance from a subcontractor to other foreseeable parties in the chain promotes the policy, so important in maritime law, that "liability should fall upon the party best situated to adopt preventive measures and thereby to reduce the likelihood of injury." *Italia Societa v. Oregon Stevedoring Co.*, 376 U.S. 315, 324, 84 S.Ct. 748, 754, 11 L.Ed.2d 732 (1964). The responsibility for discovery and prevention of a dangerous defect is shifted to the party or parties who incorporate the

defect into the product.

[45-48] The WWP stream is joined by the tributary of strict liability doctrine to give force and strength to my findings on the implied obligation of diligent performance. The three repairers all knew that the work they were performing was to benefit the vessel. Gonzales knew that they were hired by Turbine Service who contracted with Todd who was engaged by the vessel. Turbine Service also understood all of these relationships. I find that there was an implied obligation of diligent performance running from Todd to the shipowners. Because of my findings as to the red-letter clause, I find that the obligation was not extinguished by that clause. I also find that Turbine Service had an implied obligation to Todd as well as an express warranty articulated in the Todd purchase order. For purposes of this case, the express warranty and implied obligation are identical. Finally, I find that Gonzales owed the owners, Todd and Turbine Service an obligation of diligent performance arising out of their maritime contract with Turbine Service. Gonzales' obligation to Turbine Service was extinguished by the release signed by Sheridan on May 14, 1975. That release disavows any warranty or liability.[21] However, the release granted by Turbine Service has no effect upon the implied obligation to Todd or shipowners.

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21 INSPECTION & ACCEPTANCE OF REPAIR WORK

This will acknowledge that repair work done on the Seaman [sic] LP turbine rotor, HP turbine rotor, rotor casing, and labyrinth assemblies has been inspected and accepted as

[49] One might ask what "diligent performance" requires? What standard of conduct is demanded of one who owes such an obligation to another? I find that the obligation of diligent performance demands that a party conduct himself at least non-negligently. Since I have found Todd, Turbines Service and Gonzales all negligent, I also find that they all failed in their obligations of diligent performance.

BREACHES OF CONTRACT

[50] A failure to perform what is promised in a contract is a breach of that contract."[22] Todd impliedly promised owners they would perform in a diligent and work-

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(Footnote 21 continued)

being done in accordance with instructions given by Turbine Service, Inc.

Gonzales Manufacturing & Industrial Machine Works, Inc. makes no warranty as to the suitability of such repairs and accepts no liability for any possible failure in service or consequential damage arising from such failure.

22 "A failure", without justification, to perform all or any part of what is promised in a contract, is a breach thereof.

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Illustrations:

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7. A, a surgeon, contracts to perform a certain operation on B for which B contracts to pay. A performs the operation unskillfully and carelessly. He has committed a breach of contract. A promise of reasonable skill and care is inferred in fact."

Restatement of Contracts § 314 (1932); *see also* Restatement (Second) of Contracts §§ 251, 260, 262 and 266 (Tent. Draft No. 8; March 20, 1973).

manlike manner. Turbine Service made an identical promise to Todd. These promises were discussed above. When the parties failed to fulfill the obligations, the contracts were breached.

[51] The material failure of performance on the part of each repairer had the effect of a non-occurrence of a condition precedent to the duty of each repairer's employer to pay the agreed price under the terms of their respective contract.[23] The failures were "material" in that the employer in each case was deprived of the benefit which he reasonably expected. This discharges the respective employer's duty to pay the contract price they had agreed to.[24]

[52] Gonzales, on the other hand, was released from the implied obligation. Stripped of that obligation, the contract demanded no more of Gonzales than they in fact performed. Gonzales did not breach its contract with Turbine Service, yet Turbine Service has breached its contract with Gonzales in failing to pay the agreed price.

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[23] Restatement of Contracts § 314 (1932); Restatement (Second) of Contracts §§ 251, 260, 262 and 266 (Tent. Draft No. 8; March 20, 1973).

[24] Nevertheless, due to principles of restitution discussed in the damage portion of this opinion, the essential result of the damage award is that each party to the two contracts is compelled to perform as promised, *i. e.*, Todd and Turbine Service are required to pay the costs of providing their respective employers with a running turbine, and owners and Todd are required to pay the agreed price. See text accompanying fn.31 *infra*.

RED-LETTER CLAUSE

[53,54] I have found as a matter of fact that Manellis did receive a copy of the tender letter on Todd stationery with the red-letter clause on February 12, 1975. Koren testified that he gave that document to Manellis on that date and a telex signed by Manellis was sent to Diana duplicating the letter language but leaving out the red-letter clause. Owners have argued that the fact that *Manellis* received the red-letter clause does not make it a part of the contracts between owners and Todd. I have found that the contract to repair the LP turbine included the red-letter clause as one of its terms. The liability of a principal is affected by the knowledge of an agent concerning a matter upon which it is his duty to give the principal information. Restatement (Second) of Agency § 272 (1958). I have found as a matter of fact that Manellis had expressed authority to pass messages back and forth between Palios and Todd concerning bids and acceptances. Whatever else Manellis' duty may have been (and it may have been broader than I have stated it) it certainly was to pass on the terms of Todd's offers.

> The general rule which imputes an agent's knowledge to the principal is well established. The underlying reason for it is that an innocent third party may properly presume the agent will perform his duty and report all facts which affect the principal's interest. *Mutual Life Insurance of New York v. Hilton-Green*, 241 U.S. 613, 622-23, 36 S.Ct. 676, 680, 60 L.Ed. 1202 (1916).
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> The real reason for the rule which charges a prin-

> cipal with his agent's knowledge is simply the injustice of allowing the principal to avoid, by acting vicariously, burdens to which he would become subject if he were acting for himself. *Bowen v. Mt. Vernon Savings Bank*, 70 App.D.C. 273, 105 F.2d 796 (1939).
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> It is no defense that the agent did not, in fact, communicate his knowledge to his principal. *U.S. v. Hanna Nickle Smelting Co.*, 253 F.Supp. 784, 793 (D.Or.1966), *aff'd* 400 F.2d 944 (9th Cir. 1968).

See also Newsom v. Watson, 198 Okl. 220, 177 P.2d 109 (1947). I conclude that Manellis was owner's agent for the purpose of passing messages, that he was under a duty to transmit all offers faithfully and completely, and that notice to him that all work performed by Todd was subject to the red-letter clause was effective notice to owners.

[55] The owners have argued that even though it may be true that the red-letter clause was part of the initial contract to open the turbines for inspection, it did not form part of the contract to repair the LP turbine. This is not supported in the evidence. Frequently agreements are arrived at piecemeal, different terms and items being discussed and agreed upon separately. The letters that Manellis received on February 12 and February 14 specifically stated that the provisions of the offer "applied to every order for work whether written or verbal." Negotiations continued at a hectic pace throughout the next few days, but no new and distinct reference to the terms already communicated was necessary. *See Gates Rubber Company v. USM Corporation*, 508 F.2d 603 (7th Cir. 1975); *Southwest Forest Industries, Inc. v. Westinghouse Electric Corp.*, 422 F.2d 1013 (9th Cir. 1970); *Fire Association of Philadelphia v. Alis Chalmers Manufacturing Co.*, 129 F.Supp. 335 (N.D.Iowa 1955). I am of the opinion that Manellis, owner's agent for the purpose of transmitting messages, was on

full notice that the clause was implied in every repair contract between the owners and Todd.

[56,57] In admiralty a party may contract against liability for his own negligence. *Jurisich v. United Gas Pipeline Co.*, 349 F.Supp. 1227, 1229 (E.D.La.1972). A release from liability clause with a $300,000 limitation is not invalid per se in the ship repair business. *Alcoa Steamship Co. v. Charles Ferran and Co.*, 383 F.2d 46, 55 (5th Cir. 1967), *cert. denied*, 393 U.S. 836, 89 S.Ct. 111, 21 L.Ed.2d 107 (1968). Although owners have argued that the clause is not valid because the intent of the parties is not manifestly plain and unequivocal, I have found that the clause is very plain and very unequivocal in limiting Todd's liability to $300,000, limiting liability to the cost of repair, correction or replacement and making the clause in lieu of all warranties and liabilities expressed or implied.

Todd has made much of the *Alcoa Steamship* and *Hudson Waterways* cases where similar clauses were found to be valid. *Alcoa Steamship Co. v. Charles Ferran and Co.*, 383 F.2d 46 (5th Cir. 1967), *cert. denied*, 393 U.S. 836, 89 S.Ct. 111, 21 L.Ed.2d 107 (1968); *Hudson Waterways Corp. v. Coastal Marine Service, Inc.*, 436 F.Supp. 597 (E.D.Tex.1977). Their argument seems to be that since the clauses were found to be valid in those cases, they must be valid in all cases. The law is hardly as case-hardened as they would desire. It is true that such contracts exempting one of the parties from the results of his own negligence are usually legal unless public policy forbids such a contract.

Hall-Scott Motor Car Company v. Universal Insurance Company, 122 F.2d 531, 537 (9th Cir. 1941), *cert. denied*, 314 U.S. 690, 62 S.Ct. 360, 89 L.Ed. 552 (1968). But since such clauses are not the favorites of the law, courts have found various public policy reasons not to enforce them. Annot., 175 A.L.R. 1 (1947). The Restatement of Contracts limits these clauses to "negligence not falling greatly below the standard established by law for the protection of others against unreasonable risk of harm." Restatement of Contracts § 574 (1932). The comment to the above section makes it clear that the section is referring to "gross negligence."

> It is generally held that those who are not engaged in public service may properly bargain against liability for harm caused by their ordinary negligence in performance of contractual duty; but such an exemption is always invalid if it applies to harm wilfully inflicted or caused by gross or wanton negligence.

6A Corbin on Contracts § 1472 (1964 ed.)

[58,59] For reasons of public policy, I conclude that this clause is invalid when two conditions occur:

1) a shipyard undertakes to conduct substantial repair work to a component of a vessel that is vital to the vessel's safety; and

2) the shipyard's conduct is greatly below the standard established by law for the protection of others against

unreasonable risk of harm.

This conclusion is in harmony with prior decisions on this question and with the broad policies expressed by various courts when analyzing such clauses as they apply to the ship repair industry. The leading case striking down an exculpatory clause for public policy reasons was *Bisso v. Inland Waterways Corp.*, 349 U.S. 85, 75 S.Ct. 629, 99 L.Ed. 911 (1955). The court referred to a judicial rule invalidating contracts releasing towers from all liability for their negligence.

> This rule is merely a particular application to the towage business of a general rule long used by courts and legislatures to prevent enforcement of release-from-negligence contracts in many relationships such as bailors and bailees, employers and employees, public service companies and their customers. The two main reasons for the creation and application of the rule have been (1) to discourage negligence by making wrong doers pay damages, and (2) to protect those in need of goods or services from being over reached by others who have power to drive hard bargains.

349 U.S. at 90-91, 75 S.Ct. at 632. The second reason given by the court does not apply to this case. The first reason is important here. That rule of policy was not originated in a punitive spirit or out of moralistic excess. It is part of the larger policy developed and applied by the Supreme Court to encourage efficient decision-making. That policy is "that liability should fall upon the party best situated to adopt preventive measures and thereby to reduce the

likelihood of injury." *Italia Societa v. Oregon Stevedoring Co.*, 376 U.S. 315, 324, 84 S.Ct. 748, 754, 11 L.Ed.2d 732 (1964). Effective discouragement of negligence was the concern of the court in the *Bisso* case and continued to be the concern of other courts, even those who upheld the clause. The court in the *Alcoa Steamship* case faced the *Bisso* concern by finding that "potential liability for $300,000 *should* deter negligence." 383 F.2d at 55 [emphasis added]. The rule I have stated merely discourages *gross* negligence by making those who are guilty of *gross* negligence pay damages. When fault in a case is the mere failure to replace a fitting to a dropline, as it was in the *Alcoa Steamship* case, such clauses can stand; when a shipyard effectively ignores a vessel repair it has contracted to perform, red-letter clauses must fall.

LIABILITY FOR THE CORK CASUALTY

The Cork casualty occurred on July 10, 1976, about five miles off the coast of Cork, Ireland. Plaintiffs attribute any and all damage as a result of that casualty, including the loss of the ship, to the repairs that were carried out in New Orleans in 1975. Three questions are pertinent to an analysis of liability for this casualty: 1) did the excess radial clearances of the HP rotor blades cause the Cork casualty? 2) have owners satisfied their burden of proof that one of the repairers caused the excess clearances? and 3) can repairers be held liable for damages caused by a defect that was known to owners before the vessel left New Orleans in 1976?

No purpose is served by a lengthy recapitulation of the events leading to the Cork casualty. The pertinent facts are that Higgins noticed excess blade clearances in the HP in February 1976 at the time the rebuilt LP was being installed. He and Palios discussed the effect of these clearances fully. Despite this knowledge Palios decided to put the KATRIN back into service at that time. During the next few months the vessel experienced high condenser top temperatures in the LP turbine area. Higgins checked the LP and the condenser in June, but Higgins neither recommended nor did owners on their own initiative take any corrective action. The findings of fact adequately describe the events off the coast of Ireland. Several surveyors viewed the damages, and the cause of the damages was investigated. The theory advanced by Higgins was that the excess blade tip clearances had allowed steam to pass by the blades resulting in excess temperatures all the way through the turbine system. No evidence was offered to show that the casualty was caused by anything other than the excess blade clearances.

[60] Shipowners failed to prove that the excess blade clearances were caused by one or more of the repairers. There are two clear facts concerning the HP rotor blade clearances. Higgins had attended the vessel in Rotterdam in April 1973 and found the HP rotor blade clearances to be normal and satisfactory. When he opened the HP again in New Orleans in February 1976 he found the clearances to be excessive. What happened in the meantime is anyone's guess. Van Rynbach testified that he saw the HP blade

tips during an intensive investigation of the HP in February 1975 and there were no grinding or filing marks on the tips at that time. I am not convinced that Van Rynbach *could* have seen the marks since Higgins testified that in 1976 the grinding and filing marks were not visible to the naked eye. He had to use a magnifying glass to see them. Excess blade tip clearances are a matter of millimeters, and the mere fact that Van Rynbach did not notice any unusual marks on the end of the HP tips is not particularly helpful. On the other hand, Woods testified that he saw the HP turbine during an inspection before any repairs had been made and that there were no feather edges on the HP blade tips.[25] Sheridan also testified that all feather edges were missing from the blade tips in the HP before the repairs began. Other testimony on the condition of the HP including that of Harrison, Adams and Harvey, was inconclusive as to the condition of the tips or when the filing was accomplished.

[61-63] There was no direct evidence that any repairer did anything to the HP turbine blade tips to increase the

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[25] Feather tips or feather edges deserve more explanation. A blade airfoil has a relatively constant cross-section and profile from the root all the way to the tip. However, the cross-section is reduced drastically for the last few millimeters of the blade where the tip almost contacts the casing. This feather edge provides a seal between the blade tip and the casing so that steam will not escape over the blade and avoid conversion into rotating energy. The reduced volume of the feather tip is to prevent damage to turbine parts in case of contact. This may be caused by temporary misalignment due to thousands of unknowns in turbine operation. If a full-section airfoil touched the casing, severe friction and damage would occur. When a feather tip touches a casing, it is worn away, effectively machined in place, until the alignments between the various parts are corrected. Owners contend that the feather tips were missing entirely or excessively worn after the repair.

blade clearances. Woods saw filing and grinding being done on the HP blades but made it very clear, with diagrams and explanations, that he was not referring to grinding on the feather edges. He was referring to the dressing along the edge of the main trunk of the blade, but he reiterated that no feather tip at all existed on the blades at the time of that work. Owners' expert witness Harrison calculated that it would take about 130 man-hours to rotate the HP turbine in a lathe or balancing machine and file off the tips. Yet no one saw or knew of filing. This is heavy circumstantial evidence to weigh against the circumstantial evidence offered by owners that the grinding and filing was in fact done by some repairer. For that reason, I have found that owners have failed to satisfy their burden of proof that the excess blade tip clearances that caused the Cork casualty were caused by any repairer.[26]

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[26] Even if I had found that some repairer had been guilty of grinding or filing on the HP blade tips, I would have to reject owners' contention that damages for the Cork casualty are recoverable. The doctrine of "avoidable consequences" would have to be put into play in this case to deny owners any recovery. Someone in owners' position must use such means as are reasonable under the circumstances to avoid or minimize damages after discovering that another person has committed a tort, breach of contract or other legal wrong against him. The person wronged cannot recover for any item of damage which could thus have been avoided. McCormick, Handbook on the Law of Damages §§ 33-42 (1935). This particular doctrine has been amply developed by the Fifth Circuit. *Southport Transit Company v. Avondale Marine Ways*, 234 F.2d 947 (5th Cir. 1956). In essence it reflects the view that the law will not allow one to sit idly by and see his property be destroyed through forces negligently set in motion by another and then collect damages occasioned by his own failure to make reasonable exertion to arrest the disaster. *Southport Transit Company*, 234 F.2d at 951. *See also Gulf Oil v. Panama Canal Company*, 481 F.2d 561 (5th Cir. 1973); *Cottle v. Gallup*, 432 F.2d 43 (1st Cir. 1970); *Ellerman Lines, Ltd. v. President Harding*, 288 F.2d 288 (2d Cir. 1961); *Westchester Fire Insurance Com-*

INDEMNITY OF TODD

Todd has cross-claimed against defendants Turbine Service and Gonzales and their respective underwriters for indemnity in the event Todd is found liable to shipowners, together with the cost of defense. I have found that Turbine Service and Gonzales are liable and must indemnify Todd for their losses, but not for the cost of defense.

(Footnote 26 continued)
pany of New York v. Pennsylvania Railroad Co., 96 F.2d 133 (2d Cir. 1938); *The Ashbury Park*, 147 F. 194 (2d Cir. 1906); *The Mars*, 9 F.2d 183 (S.D.N.Y.1914).

Although unerring foresight is not required of one who seeks to avoid or minimize damages, I have concluded that the decision to let the KATRIN sail made by Palios, consulting with Higgins, was unreasonable under the circumstances. Although Higgins consulted with Warncross of Siemens, I have concluded that this was not sufficient consultation or care under the circumstances.

One reason courts are generally reluctant to impose the doctrine of avoidable consequences on plaintiffs who make wrong decisions is that human beings frequently make wrong decisions in emergencies. Thus, in collision cases a master who makes a wrong decision that results in the sinking of a ship may not be held to a high standard of reasonableness. *The Walter A. Luckenbach*, 14 F.2d 100 (9th Cir. 1926). There was no haste or emergency in the instant case.

The decision Higgins and Palios faced is very nearly the same faced by other owners in an earlier case. In that case the damage was surveyed the next day by a competent surveyor acting in behalf of the underwriters. It was determined that the ship was not unseaworthy but could proceed on her voyage and have the necessary repairs made later. The repairs could have been made immediately. The master decided to proceed at once on the voyage since the vessel was already partially loaded. On the trip, the ship suffered vibration due to the propeller damage. The plaintiffs then claimed that item of damage in their lawsuit. The court disallowed the claim. "It is clearly the duty of a party injured by the tort of another to take reasonable steps to minimize the amount of the damage." *Isthmian Steamship Co. v. Jarka Corp. of Baltimore*, 100 F.Supp. 856, 861 (D.C.Md.1951). Although the decision facing Palios and Higgins involved different variables of time and cost, it was also

[64] I must make it clear from the outset that this conclusion is not based upon the concepts of "active" or "passive" negligence. When an obligation of diligent and workmanlike performance has been breached, concepts of active and passive negligence are not pertinent to the question of whether one party should be indemnified. The *Ryan* case made it plain that a party seeking indemnity could rely upon contractual rights of indemnity as distinguished from concepts of "primary" and "secondary" or "active" and "passive" tortious conduct. *Ryan Stevedoring*, 350 U.S. at 133, 76 S.Ct. 232. This distinction was reaffirmed in later cases. *Weyerhaeuser Steamship Co. v. Nacirema Operating Co.*, 355 U.S. 563, 569, 78 S.Ct. 438, 2 L.Ed.2d 491 (1958); *Johnson v. Sword Line, Inc.*, 257 F.2d 541, 545 (3rd Cir. 1958); *Schipper v. Lockheed Aircraft Corp.*, 278 F.Supp. 743, 746 (S.D.N.Y.1968).

[65] The obligation of diligent and workmanlike service is comparable to a manufacturer's warranty of the

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(Footnote 26 continued)
basically an economic decision to sail the vessel in the face of risk. They were not faced with an emergency, and there was sufficient time and facilities for adequate consultation and consideration of the problem. Owners' counsel admitted at the trial that the decision was made with "eyes wide open." What is reasonably required of an owner in this case "depends on the extent of the threatened injury as compared with the expense of remedying the situation, and the practical certainty of success in preventive effort." *Rathborne, Hair and Ridgway Co. v. Williams*, 59 F.Supp. 1, 3, 4 (E.D.S.C.1945). It is clear that the extent of the threatened injury in this case was quite great indeed. Ultimately, the decision almost cost the entire vessel and the lives of its crew. I conclude that the damages suffered by the owners due to the Cork casualty were consequences which were avoidable with the exercise of reasonable care and that owners' decision to put the ship to sea with excess clearances was not conduct amounting to reasonable care.

soundness of its manufactured product. *See Ryan Stevedoring,* 350 U.S. at 133-34, 76 S.Ct. 232. A demand for indemnity in cases of breaches of warranty of merchantability "is based upon the theory that where one sells a product to another under an implied warranty of merchantability and this buyer in turn, re-sells the product, also giving an implied warranty of merchantability to his buyer, the original seller is liable over to his buyer if this second warranty is breached and the first buyer can establish that the product was sold by him in the same condition as when it was purchased from the original seller." *Grummons v. Zollinger,* 189 F.Supp. 64, 65-66 (N.D.Ind.1960). The same general principles have also found expression in two different Restatements.[27]

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[27] Where a person has become liable with another for harm caused to a third person because of his negligent failure to make safe a dangerous condition of land or chattels, which was created by the misconduct of the other or which, as between the two, it was the other's duty to make safe, he is entitled to restitution from the other for expenditures properly made in the discharge of such liability, unless after discovery of the danger, he acquiesced in the continuation of the condition.

Restatement of Restitution § 95 (1937).

Although we are here concerned with contractual principles, an identical result would be mandated by the proposed principles in the Restatement of Torts:

> (1) If two persons are liable in tort to a third person for the same harm, and one of them discharges the liability of both, he is entitled to indemnity from the other if the other would be unjustly enriched at his expense by the discharge of liability.
>
> (2) Instances in which indemnity is granted under this principle include the following:
>
> * * * * * *

[66] When an obligation of diligent and workmanlike performance is owed by one party to other parties, the determination of whether contractual indemnity should be allowed requires that a court weigh the conduct of both parties to determine:

> 1) whether the obligation was breached; 2) whether that breach proximately caused the injuries; and 3) whether the proposed indemnitee's conduct prevented the diligent and workmanlike performance.

See Parfait v. Jahncke Service, Inc., 484 F.2d 296, 302 (5th Cir. 1973); *Garner v. Cities Service Tankers Corp.*, 456 F.2d 476, 481 (5th Cir. 1972); *Southern Stevedoring and Contract Co. v. Hellenic Lines, Ltd.*, 388 F.2d 267 (5th Cir. 1968); *Waterman S.S. Corp. v. David*, 353 F.2d 660, 665 (5th Cir. 1965), *cert. denied*, 384 U.S. 972, 86 S.Ct. 1863, 16 L.Ed.2d 683 (1966).

[67] I have already discussed my findings that the obligations of diligent performance owed by Turbine Service and Gonzales to Todd were breached. I also find that those breaches proximately caused the injuries in this case, as I have discussed above in the negligence analysis.

(Footnote 27 continued)

> (d) the indemnitor supplied a defective chattel or performed defective work upon land or buildings, as a result of which both were liable to the third person, and the indemnitee innocently or negligently failed to discover the defect;....

Restatement (Second) of Torts § 886B, Tentative Draft No. 18, April 26, 1972.

In the *Waterman* case, the court found guidance for its deliberations on whether or not a proposed indemnitee's conduct prevented workmanlike performance from the Restatement of Contracts §§ 295 and 315 and Corbin on Contracts §§ 571, 947 and 1264. Using those sources and the cases cited above, I find that Turbine Service did not burden, delay or interfere with the performance of Gonzales in an unreasonable manner, and that Todd did not burden, delay or interfere with the performance of either Turbine Service or Gonzales. I also find that the shipowner did not prevent or hinder any of the repairers in performing in a diligent manner.

[68] Throughout the trial, Turbine Service and Gonzales made much of the fact that they had been *ordered* to do certain things that constituted nondiligent performance. Since I have found that no agent of the owners even knew of the welded blades and since the breaches of obligations involved in this case occurred due to the conduct of the repairers with respect to these welded blades, this argument must fail as a matter of fact.[28]

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[28] Even if the owners' two agents did know of the plan to weld blades to roots and authorized, approved or passively acquiesced in this conduct by the repairers, I have serious doubts that this would be conduct "preventing diligent and workmanlike performance." When a shipowner arrives in a shipyard, he is under no legal obligation to hire an independent surveyor to determine whether or not the advice he is receiving from the shipyard and the specialists they hire is correct. It may be prudent to do so, but from a contractual point of view, the ship repairer has agreed to provide workmanlike advice and repairs. Thus, if owners' agents with little experience in steam turbine reblading jobs and doubtful competence in the English language order a repairer to perform in a manner that would be considered unacceptable throughout the industry, the obligation of diligent performance should demand that the repairer clearly warn the shipowner in unequivocal terms of the inadvisability of the repair.

[69,70] I have given great consideration to contentions that Todd's own conduct should preclude them from receiving indemnity from other wrongdoers. It is clear by now, however, that, although Todd may have failed in its obligations to the shipowner, this failure has no effect upon the relationships between Todd and its subcontractors.

> "Whatever may have been the respective obligations of the stevedoring contractor and of the shipowner to the injured longshoreman for proper stowage of the cargo, it is clear that, as between themselves, the contractor, as the warrantor of its own services, cannot use the shipowner's failure to discover and correct the contractor's own breach of warranty as a defense." *Ryan Stevedoring Co. v. Pan-Atlantic Steamship Corporation*, 350 U.S. 124, 134-35, 76 S.Ct. 232, 238, 100 L.Ed. 133 (1956).

This principle is another that has experienced constant development since its expression in the *Ryan* case. When an action over is in contract, whether the proposed indemnitee can recover turns upon whether his actions are such as to prevent the diligent performance of the proposed indemnitor and not upon whether he has or has not been found negligent in regard to the shipowner. *Calmar Steamship Corporation v. Nacirema Operating Co.*, 266 F.2d 79, 81 (4th Cir. 1959). Where a party initially creates a hazard, the negligent failure of another party to discover the danger does not preclude indemnity. *DeGioia v. United States Lines Co.*, 304 F.2d 421, 424 (2nd Cir. 1962). All of these principles have been specifically addressed and adopted by the Fifth Circuit. *Southern Stevedoring and*

Contract Co. v. Hellenic Lines, Ltd., 388 F.2d 267 (5th Cir. 1968).

Turbine Service made an express warranty that all goods and labor would be merchantable and fitting in all respects for the purpose for which intended. Because there was a contract between the two parties, privity, that old bugaboo of products liability, does not enter the analysis. It does materialize in the decision concerning indemnity of Gonzales to Todd. I have found above that it has been exorcised in such situations and is not a condition precedent in the granting of indemnity. The "obligations which arise from the implied warranty are not limited to the confines of the usual action on contract; the zone of responsibility may extend to parties who are not in direct contractual relationship." *Whisenant v. Brewster-Bartle Offshore Company*, 446 F.2d 394, 401 (5th Cir. 1971).

[71] When one or more parties manufactures a defective product that is placed in the stream of commerce and another party has no actual knowledge of the defect, a cause of action for indemnity against the manufacturer or manufacturers will lie even when the failure to inspect and discover is considered negligent. *Jennings v. United States*, 374 F.2d 983, 987 n.7 (4th Cir. 1967); *Hales v. Green Colonial, Inc.*, 402 F.Supp. 738, 741 (W.D.Mo.1975), *aff'd in part, Hales v. Monroe*, 544 F.2d 331 (8th Cir. 1976).

OTHER INDEMNITY CLAIMS

[72,73] Turbine Service and Travelers have also cross-claimed against Gonzales and Sentry for indemnity for negligent workmanship by Gonzales. Since Sheridan signed a release extinguishing the warranty from Gonzales to Turbine Service, Turbine Service cannot rely upon the contractual indemnity rules discussed above.[29] Without the benefit of contractual indemnity rules, Turbine Service must rely upon the normal negligence standards. To reach my conclusion in this case I have made reference to the Restatement (Second) of Torts Section 886B discussed above and the principles of active and passive negligence prevalent in maritime law.[30] It is my conclusion that Turbine Service can not recover indemnity from Gonzales under either of these theories or under any other non-contractual indemnity theory that I can find. Drawing from all the facts and circumstances of the case, I cannot find that Turbine Service was "passively" negligent compared to Gonzales. Both were aware of and participated in tandem in the blade-welding operations. Both "supplied a defective chattel" to another party.

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[29] Although the release may extinguish a warranty or other implied obligation, there is a serious question as to whether the release is sufficient to release Gonzales from liability due to its own negligence. The clause does not mention negligence or any cognates of it. Although a party may contract against liability for his own negligence, such an agreement must clearly indicate the intentions of the parties. *Jurisich v. United Gas Pipeline Company*, 349 F.Supp. 1227, 1229 (E.D.La.1972). I do not reach here the validity of the release with regard to Gonzales' negligence.

[30] "[I]t is a generally recognized provision of law in virtually every jurisdiction that the right of indemnity exists between parties, one of whom is guilty of active or affirmative negligence, while the other's fault is only technical or passive." *Tri-State Oil Tool Industries, Inc. v. Delta Marine Drilling Co.*, 410 F.2d 178, 181 (5th Cir. 1969).

[74] Gonzales also seeks indemnity from Turbine Service for any liability it may have to shipowners or Todd. No warranty of workmanlike performance ran from Turbine Service to Gonzales, and Gonzales must rely on non-contractual rules of indemnity that I have just discussed with regard to Turbine Service's claim of indemnity against Gonzales. For reasons indicated in that discussion, I also conclude that Gonzales is entitled to no indemnity from Turbine Service. Although Gonzales has insisted throughout the litigation that they were merely following orders, their duty was not a "secondary duty." They knew what the parts they manufactured were going to be used for and who was going to use them, and the harm they set in action was not aggravated by the acts of any other party later on.

IV. *DAMAGES*

PROPER MEASURE

Not surprisingly, the parties in this case have advocated principles of damage recovery that constitute two extremes. Owners have asked for the full cost of repairs conducted in Europe by Siemens and loss of use from May 25, 1975 to March 2, 1976. Their contention is that, by virtue of the contract, they deserved to have a turbine in "good operating condition" and the Siemens repairs were necessary to put the KATRIN's LP turbine into "good

operating condition."[31] They also suggest that the defective repairs were of no benefit to them so they should not be required to pay any portion of the agreed price to Todd.

Repairers contend they are required only to "make owners whole." They argue that the turbine was in serious disrepair when it arrived at Todd and that they should be liable for no more than enough to return the LP turbine to that same condition. They also allege that the turbine was in better shape after the river trial casualty than when it arrived, except for the welded blades, the spacer rings and the shrouding. Thus, they argue, they should only be charged with enough damages to pay for the removal of the welded blades, shrouding and rings and for loss of use for the period it would have taken to accomplish those removals. The essence of their theory is that such damages are sufficient since the KATRIN could then have sailed out of Todd in no worse condition than when it arrived. Repairers also contend that owners suffered no loss of use. They argue that they are liable for damages to return owners to a position they would have occupied but for the faulty repairs. Since the faulty repairs caused a loss of time only from February to May 1975 and since the vessel was laid up for boiler and bulkhead repairs anyway during most of that time, they suggest their negligence has caused only a few days loss of use.

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[31] "Good operating condition" means different things to different people. Repairers, for instance, have suggested that the Siemens repairs put the turbine into what I might call "best operating condition," a superlative state that owners were not entitled to achieve at repairers' expense.

[75] I find that the proper measure of damages to be awarded shipowners in this case is the sum of the cost of repairs to return the LP turbine to the state it would have been in had the contract been performed, necessary expenses during down time of the vessel, loss of profits during down time (the down time being the amount of time it would have taken Todd to complete the repairs necessary to restore the LP turbine), and costs and attorney's fees. *Thibodeaux v. Texas Eastern Transmission Corp.*, 548 F.2d 581, 587 (5th Cir. 1977); 5 Corbin on Contracts § 1037 (1964).

[76] This conclusion is founded upon several general principles of damage law. These principles were somewhat difficult to isolate since this case involves negligence, breaches of implied obligations and breaches of contract all at the same time. I have been pressed by the repairers to adopt what is essentially a tort measure of damage calculations. Using that measure, a party suffering injury to his property is entitled to no more than restoration to its condition prior to the wrong. *Petition of M/V Elaine Jones*, 480 F.2d 11, 27 (5th Cir. 1973). The purpose of compensatory damages in tort cases is to place the injured person as nearly as possible in the condition he would have occupied if the wrong had not occurred. *Freeport Sulphur Co. v. S/S Hermosa*, 526 F.2d 300, 304 (1976).

[77] I reject this tort measure of damages because this case is something more than a maritime tort. Although I have found that the repairers were guilty of negligence, I

have also found that Todd breached its contract with the vessel owners. The tort measure of damages is applied in classic cases where two parties unknown to one another come into contact and one comes away damaged, such as collision cases and other maritime torts. But Todd here breached its contract to repair the LP turbine and this single fact requires adoption of a different measure of damages.

[78] Damages awarded for breach of contract should return the party to the position he would have occupied had the contract not been violated. *E. C. Ernst, Inc. v. Manhattan Construction Company of Texas*, 559 F.2d 268 (5th Cir. 1977); *Meltzer v. Roof Coatings, Inc.*, 536 F.2d 663, 666 (5th Cir. 1976); *Weldon v. Crooks*, 24 So.2d 479, 481 (La.App. 2nd Cir. 1946). Whatever damages the defendant might have foreseen as a reasonable man in the light of the facts known to him may be recovered. McCormick, Handbook on the Law of Damages 565 (1935).

Relating these principles to the facts in this case, Todd breached its contract to replace rotor rows 11-14 and other rotor blades. If the contract had been performed, the KATRIN would have sailed from New Orleans with an operating LP turbine on May 25, 1975. It was foreseeable to Todd that a failure to perform that contract would leave the owners with an unrepaired and non-operable vessel. Todd could foresee that this would require expenditures to repair the LP turbine and maintain the ship while it was out of service and would also prevent the vessel from mak-

ing any profits during the period it was out of service. The vessel owners are entitled to have the LP turbine in the condition contracted for. They also are entitled to recover for loss of use as a proper element of damage. *The Conqueror,* 166 U.S. 110, 125, 17 S.Ct. 510, 41 L.Ed. 937 (1897).

[79] Two or three principles guide loss-of-use calculations. Although proof of loss of profits must rise above the level of mere surmise and conjecture, the fact that such damages are difficult to measure and by their nature are uncertain in amount does not render such damages unrecoverable. *Natco, Inc. v. Williams Brothers Engineering Company,* 489 F.2d 639, 640 (5th Cir. 1974). Furthermore, any calculation of loss of profits must be a calculation of the net loss. Granting owners the gross amount obtainable by the ship during the period of lost time would result in a windfall to the owners. *Rowell v. Treadwell Ford, Inc.,* 511 F.2d 164, 166 (5th Cir. 1975).

[80] Owners sent the LP turbine to Siemens for repair. If a party who has been damaged contracts to have the damage repaired and orders additional work not included under the first contract, the amount performed under the second contract is not the correct measure of damages and it becomes a factual question to determine the amount the owner of the property would have paid to have only the uncompleted work performed by another contractor. *Steffen v. United States,* 213 F.2d 266, 271 (6th Cir. 1954).

The owners can recover whatever cost was necessary

to repair the LP turbine to the condition that it should have been in had the contract with Todd been properly performed, but no more than that. Calculations as to loss of use must also take into account that owners can recover only for the time starting May 25, 1975 that it would have taken to restore the turbine to the contracted-for condition.

[81-83] A further consideration is that the damages that owners are entitled to recover for the breach of contract is the difference between the reasonable cost of having such a contract completed according to its terms and the amount remaining unpaid to the contractor under the original contract. *Steffen v. United States*, 213 F.2d 266, 271 (6th Cir. 1954); *Green Manor Construction Company v. Highland Painting Service*, 345 F.2d 657, 661 (1st Cir. 1965). If a defendant's breach of contract saves expense to a plaintiff by discharging his duty of rendering a performance in return, the amount of this saving is deducted from the damages that would otherwise be recoverable.[32] Restatement of Contracts § 335 (1932); *Interstate United Corporation v. White*, 388 F.2d 5, 7 (10th Cir. 1967).

A case supporting my conclusion on the elements of damages is *Midwest Marine, Inc. v. Sturgeon Bay Ship-*

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[32] Since owners are excused from performance by the material breach of Todd, they need not perform their part of the bargain. But, since Todd's breach has discharged owners' duty to pay the contract price, the balance owing Todd is deducted from the damages that would otherwise be recoverable from Todd. In the end, this is equivalent to forcing both parties to perform their parts of the bargain.

The same analysis applies to the recovery of Todd and Turbine Service vis-a-vis their contract with one another.

building and Dry Dock Company, 247 F.Supp. 283 (E.D.Wis.1965). In that case, the defendant had partially overhauled and installed diesel engines in a vessel for the plaintiff. The district court held that the defendant had been negligent in overhauling the engines and granted damages to the plaintiff in four categories: engine damage, loss of use, out-of-pocket expenses, and interest. *Sturgeon Bay*, 247 F.Supp. at 289. Although not strictly binding on this court, I find the *Sturgeon Bay* case persuasive.

DAMAGES TO RETURN LP TURBINE TO CONTRACTED-FOR CONDITION

The first problem encountered when attempting to calculate damages to put a party into a position he would have been in had the contract been performed is to determine what that wholly fictional position would have looked like. I must emphasize that the contract with Todd did not contemplate giving the owners a turbine free of all defects nor did it contemplate overhauling the turbine to the extent carried out by Siemens later. It was a contract to replace LP rotor rows 11-14 with serviceable blades; to fair and dress blades in rows 1-10 of the rotor; to replace a total of 63 blades in those rows; to fair and refit row 15 blades; to renew the labyrinth packing in the lower LP casing; to fair and dress and reinstall stator blades; to balance the LP rotor and install with proper clearances; to remetal, machine and install the LP fore and aft journal bearings; and to polish the rotor journals. From Ault's report of the damage, the joint field survey of July 21, 1975 and

McPhate's report, I find that the following work was left to be done in order to achieve that contracted-for condition:

1) A total of 407 rotor blades had to be tightened and 63 welded blades had to be replaced in rows 1 through 10.

2) All rotor blades in rows 11-14 had to be replaced.

3) All of the rotor blades in row 15 had to be inspected, faired and straightened.

4) All blades in rows 1-13 of the casing had to be inspected and a few had to be straightened, dressed or tightened.

5) All of the stator blades in rows 14 and 15 had to be replaced.

6) The rotor barrel had to be dressed and electric welding cleaned off.

7) The rotor barrel grooves had to be inspected and, in the case of row 14, remachined.

8) The spacer rings had to be removed.

9) The forward journal had to be polished, the forward bearing had to be removed, machined and fitted.

10) The aft journal had to be polished and the aft bearing had to be remetalled, machined and refitted.

11) Front and back stuffing boxes required repair.

The proper measure of damages is the cost to do this work plus the expense and loss of profits for the time it would have taken to do it. The owners have contended that repairers were responsible for the warped casing. I have found that insufficient evidence was produced to support this contention. The owners have also argued the unsatisfactory condition of many of the stator and rotor blades was due to faulty repair. I find that owners did not prove by a preponderance of the evidence that the unsatisfactory condition of the rotor and stator blades (other than the welded, fabricated blades) was due to the river trial casualty or repairers' negligence.

Steps 1, 2 and 5 of the above work list would have required replacement blades. The total number of blades that would have had to be manufactured was 763, 532 in rotor rows 11 through 14, 63 in miscellaneous rows and 206 in stator rows 14 and 15 (the latter figure counted from photos in evidence). One estimate of the cost of 763 blades is the quotation that Sheridan received from La Sona Corporation in March, 1975. Sheridan sent sample blades from the KATRIN to obtain a quote on the time and cost to produce the replacement blades. The average cost of a blade from that quote was $47. Using this estimate the cost of 763 new blades to fit the KATRIN's turbine plus tooling costs would have been $30,000.[33] Another estimate of

[33] The price of blades ultimately fabricated by Siemens appears to have been about half as high. Siemens used blades that it had in stock rather than manufacture new ones. However, this necessitated remachining and other alterations on the casing and rotor. Since the whole turbine was being overhauled, this was an economical decision. However, if the only work that had been accomplished was the replace-

blade prices is provided by a Siemen's telex of August 13, 1975, which shows that the larger blades in rows 11-14 cost more per unit than the smaller blades in rows 1-10. Using that quote and considering how many blades of the various sizes were necessary, the total price for blade fabrication would have been $61,000. Since the La Sona quote does not clearly specify what blade sizes they were using to make their price quote, the Siemens' quote in August provides a better estimate of the blade fabrication prices. I find that the price to manufacture blades necessary to bring the turbine up to the contracted-for condition was $61,000.

The best estimate of how much the remaining repairs would have cost are the charges Siemens actually made for the work in question. Although some of the estimates are difficult to make because the Siemens prices cover work that was necessary due to faulty repairs as well as work that repairers were not responsible for, a reasonably accurate evaluation from their quotes and invoices is possible. Closing blades had to be manufactured at a cost of DM 75,000 (seventy-five thousand deutsche marks). An order confirmation dated October 2, 1975 lists the prices for the repair work at Siemens. Items 1 and 2 cover cleaning, removal and reinstallation of blades; machining of casing and parting faces; reworking of rotor bearing points; balancing of the rotor and measurement of clearances. The machining of the casing and parting faces should not be

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(Footnote 33 continued)
ment of blades, it is not at all certain that the total price for replacements and alterations would not have exceeded the $30,000 figure quoted by La Sona.

attributable to repairers so that items 1 and 2 should be reduced by 10%. Items 1 and 2 should also be reduced by another DM 71,300 since it is clear from the order confirmation that that much work was required by classification society for problems not attirbutable to repairers. Items 1 and 2 should be reduced by another 10% (according to the calculations of owners' expert Higgins) since they included certain items of work not attributable to the river trial casualty. In sum DM 296,700 minus 20% (DM 59,340) for a total of DM 237,360 represents the recoverable total from items 1 and 2.

Items 5 and 6 of the confirmation order are labyrinth seals, the repair of which should be recoverable at a cost of DM 4,700. Item Number 4 involving stuffing boxes, was also a repair caused by the damage during the river trial casualty according to testimony by Higgins. This charge was DM 19,500. The invoice for DM 14,633.89 for packing and returning to New Orleans and the DM 62,622.02 for the attendance of factory representatives in New Orleans for reinstallation are also recoverable items. The turbines had to be repaired, and the most competent repairers available were the manufacturers. It was necessary to ship the turbine to Germany. The fact that extra repairs were also accomplished there is immaterial to recovery for shipping costs. The turbine also had to be reinstalled. The attendance of factory representatives to aid in the reinstallation was reasonable and prudent.

The total charges for that portion of the Siemens

work that was attributable to damages due to the negligence or breaches of repairers' obligations was DM 413,815.91. At the prevailing rate of exchange then quoted by Siemens of 2.58 DM/dollar, the total dollar amount of $160,393.76.

The sum of the cost of replacement blades and repair expenses is $221,393.76. This amount is recoverable by owners as necessary to restore the LP turbine to the state contracted for.

DAMAGES FOR LOSS OF USE

[84] As I have already indicated, the owners can recover for loss of use of the vessel. We must first decide how many days the vessel was out of use as a result of the repairers' actions. This is complicated by the fact that the vessel was kept out of service longer than necessary to repair recoverable damages. The owners are entitled to recovery for as many days as it would have taken to put the KATRIN in the condition that they had bargained for. They are not entitled to any extra time due to their own decision to perform a more elaborate repair than their contract with Todd. To determine the number of days recoverable, I am required to evaluate how long the repair specified above to return the KATRIN to the contracted-for condition would have taken.

[85] From May 25, 1975 when the KATRIN should have returned to commerce until July 21, 1975 when the

final field survey was made with all parties present, no one was sure what had happened to the turbines nor how to repair them. I find that these days are recoverable by owners since they constituted a delay caused by repairers' faulty work. After a major marine casualty, surveys, consultations and inquiries must be made. Furthermore, investigation was hampered to some degree by Turbine Service and Gonzales holding turbine parts in their shops while demanding full payment and Todd's failure to negotiate their release. This loss of time was a foreseeable result of the repairers' conduct. However, on July 21, 1975 all available information was in the hands of owners and the repair period should be considered as starting on that date. It is difficult to evaluate how long all of the repairs specified above to bring the turbine to the contracted-for condition would have taken. However, one element of that repair, the manufacture of necessary replacement blades, would have taken longer than all of the other repairs. The repair period can be calculated by determining how long it would have taken to manufacture the requisite number of blades and adding to that the time necessary for their installation.

In mid-June of 1975, Siemens quoted a delivery period of 8 months for a complete set of stator and rotor blades. The delivery time could have been shortened to about 4 months if overtime were accepted. However, it must be kept in mind that such an estimate is excessive since it covered a complete reblading of the turbine. A more accurate estimate is provided by the La Sona quote

obtained by Sheridan in March. La Sona promised delivery by June 16, 1975, a period of 96 days. This estimate, in contrast to the Siemens estimate, is less than the time that would have been needed. Sheridan was contemplating reblading 570 blades at the very most.[34] The owners would have had to order that number of blades in July plus an additional 206 blades due to the extra damage caused by the river trial, and increase of 27%. I find that a reasonable estimate of the time necessary to manufacture the blades needed to repair the KATRIN's turbine after the river trial casualty is 122 days. Several experts testified as to the amount of time it would take to reinstall the blades and put the vessel back in service once the manufacture of blades had been completed. Estimates between 3 and 6 weeks were made. I find that 5 weeks is a reasonable figure for the reinstallation of blades and putting the vessel back into service, a total of 35 days. I also find that the total figure of 215 days is the amount of time it would have taken to conduct repairs on the LP turbine to return the turbine to the condition it should have been in on May 25, 1975. Owners can recover loss of use for that entire period of time.

[86] The next problem is to determine what the loss of use cost the owners per day. Owners have claimed almost $4,000 per day is a correct figure. Todd suggests that anything over $500 per day is unwarranted. They apparently base this low figure on their contention that the "golden era" in the shipping industry ended in early 1975. The record of the vessel on past voyages is the best

[34] An unknown number of ship's spares were to be used, thereby reducing the number of new blades that would have been needed.

measure of the damages due to loss of use. *The Conquerer*, 166 U.S. 110, 17 S.Ct. 510, 41 L.Ed. 937 (1897). The only evidence provided to aid in the calculation of lost profits was the testimony of Palios, Koulouris and owners' documents.

The profit and loss account for the year ending December 31, 1974, shortly before the vessel arrived at Todd, shows figures for both 1973 and 1974. During that time the profit earned by the KATRIN was $998,610.85, starting on January 18, 1973. This is an average net profit of about $1400 per day. If one looks at 1974 alone, the profit for the year was $728,659.58, almost $2,000 per day. If, as owners urge, I take into account only voyages 2 through 7, the last half of 1974, the profit per day is almost $4,000 per day. There is some justification for owners' position. Between January 18, 1973 and June 29, 1974, the KATRIN was under time charter at a rate of $2,300 per day. In the latter half of 1974, the vessel was engaged in trading that was much more profitable per day.

It is difficult to determine from the evidence what the market would have been like on May 25, 1975 when the KATRIN should have entered trading once again. When the river trial casualty occurred, the KATRIN was on its way to meet a charter obligation for bulk wheat. Using the known freight rate for that charter and anticipated steaming time and distance, Palios estimated that the net profit per day would have been $2,435. The three charters the vessel was engaged for during 1976, after leaving New Or-

leans and before the Cork casualty, show an average freight rate of $10.95 per long ton. The average freight rate shown on the five freight voyages of latter 1974 was $23.04. Thus, the freight rate available to the KATRIN in 1976 was about half of the rate being paid for the vessel's use in late 1974.

[87] Taking all of these calculations into account I find that a reasonable net profit figure is $3,000 per day. I think the owners have not shown that the $4,000 per day profit would have been possible starting on May 25, 1975. However, as late as 1976, the KATRIN was able to obtain some charters for a freight rate of $18.50 per long ton, almost twice the rate of the May 25, 1975 charter. I am convinced that $3,000 per day net profit is a reasonable figure for the 215 days delay caused the KATRIN, making a total of $645,000 recoverable damages for loss of use.

DAMAGES FOR OUT-OF-POCKET EXPENSES

[88] Owners have claimed expenses incurred during the vessel's stay at New Orleans from May 25, 1975 to March 2, 1976. I have found that the owners can recover for a loss of use for 215 days. This means that the ship would theoretically have been able to sail on December 26, 1975, if owners had chosen to undertake repairs limited to restoring the LP turbine to the condition it should have been in on May 25, 1975. Expenses at New Orleans can be divided into two categories: 1) those that are recoverable only if they were expenses incurred before December 26,

1975; and 2) those made for items that were necessary, irrespective of whether they were performed before or after December 26, 1975. Reinstallation expenses are an example of recoverable damages that fall in the latter category. The LP turbine had to be reinstalled at some point. The fact that it was not accomplished until after December 26, 1975 does not make it any less recoverable.

[89] The port expenses have been divided into four agents' accounts from Hansen & Tidemann. The August 13, 1975 account is fully recoverable, a total of $7,277.28. The account dated September 22, 1975 is recoverable in full for a total of $9,270.51. The major dispute in that account is whether or not crating expenses, ocean insurance and ocean freight for sending the turbine parts back to Germany should be recoverable. Since I have found that it was reasonable and prudent to send the LP turbine back to Siemens to have repairs performed, freight and related expenses are also recoverable.

[90] The account dated November 18, 1975, a total of $2,232.44 is also recoverable. Repairers have contended that the item for the Germanischer Lloyd survey fee and expenses is not recoverable since the charges were ordinary and necessary operating expenses. I reject this because the total Germanischer Lloyd invoice for surveys is for almost twice that amount, the owners claiming recovery only for the "Inspection of Damages to Low Pressure Turbine Rotor and Casing."

[91] The account dated April 26, 1976 was for a total of $125,974.92. The following reductions must be made from that account. The agency fees must be reduced by $1,040, reflecting a fee up to December 26, 1975. A deduction of $100.32 for wire ropes and $353.88 for blocks and shackles must be made. Although they were purchased specially for the repairs, they then became part of the ship's property, presumably continuing to benefit the owners. A sum of $5,886.62 must be deducted from the insulation expenses based upon the testimony of Higgins that only about two-thirds of the invoice was attributable to insulation on the HP or LP.[35] The Alpha Omega invoice must be disallowed. A total of $9,225 was for items related to the casing distortion, not caused by repairers. Owners were not able to present any evidence to show that any of the other items on the invoice were caused by repairers' conduct.

[92] In addition, the hotel expenses of Tsalikis do not appear justified. Higgins was handling the reinstallation for owners until February 14, 1976. After that O'Brien was asked to supervise the repairs. Owners made no showing of a need for two port engineers during the reinstallation. Total expenditures claimed for Tsalikis were $2,150.23.

[93] All of the other expenses on the April 26, 1976 account are recoverable, making a total of $102,142.88. All

[35] Charges for insulation on the HP are recoverable because it was reasonable for the owners to open up the HP after the river trial casualty to inspect the HP turbine to determine if it was damaged.

of the Ardell invoices and expenses are recoverable. Although Todd made an offer to reinstall the LP turbine for $29,000, owners were reasonable in attempting to make the reinstallation themselves, considering the past problems with Todd. In addition, relations between Todd and the owners were anything but clear at this time; Todd appeared to be demanding the balance of accounts before performing the reinstallation work. Higgins inquired into bids by other local shipyards as did O'Brien. All of the other New Orleans shipyards appeared to be reluctant to cooperate with the owners for reinstallation, some on advice of counsel. The hourly labor charge by Ardell, a New York company, was $15. Todd's contract estimator testified that riggers and other laborers of that class were earning between $17 and $20 per hour at the time of the reinstallation. I find that the charges for pilotage, wharfage, tugs and line handlers, Siemens' expenses and all other expenses on the April 26, 1976 account are reasonable and prudent under the circumstances existing at the time of reinstallation.

The total recoverable for the Hansen & Tidemann accounts is $120,923.11. I find that all those charges were fair and reasonable under the circumstances and attributable to the faulty conduct of repairers.

[94] The expenses of the expert surveyor Higgins are recoverable charges with the exceptions listed below. Higgins was required to come to New Orleans twice after the river trial casualty to participate in surveys and discus-

sions about how to deal with the damaged turbines. He also attended the overhaul of the LP at Siemens and he supervised the reinstallation of the LP turbine in New Orleans in January and February 1976. His bill for services and expenses was L11,120 (eleven thousand one-hundred twenty pounds sterling). I find that owners have not presented sufficient evidence to show that the services Higgins rendered at Siemens (along with a short trip to Athens) were foreseeable expenses made necessary by the repairers' conduct. The total amount recoverable for Higgins' services and expenses is L5,260 for trips and L882 for general overhead expenditures connected with the same services. This makes a total of L6,142, which converts to $11,292.07 at the rate of exchange prevailing on the date of invoice.

[95] Owners have also claimed an amount for general expenses from the master's accounts, repatriation expenses, travel expense for recrewing, bottom cleaning due to drydocking expenses, bunkers and lube oil, and a bond premium. The master's general accounts are for sundry payments, wages, overtime, fringe benefits, and victuals. The master's account from August 7, 1975 to February 24, 1976 is for a total of $32,328.13. I find that only 66% of this should be due, since the ship should have sailed on December 26, 1975 if owners had not had extra Siemens repairs. The total recoverable for the master's general accounts is $76,526.72.[36]

[36] Gross profits are not recoverable because owners would not profit that much if the vessel were in operation. However, normal expenses for standby crew and fuel are recoverable as out-of-pocket expenses. Otherwise, these expenditures would reduce the owners' loss-of-use recovery to a figure below what they would have made in normal operation.

[96] The repatriation and recrewing expenses of $22,395.02 are recoverable in full. Owners attempted to mitigate damages by returning crew members to Greece and recrewing once the repairs were finished. One full changeover by owners should be recoverable from repairers.

The $7,400 claim for bottom cleaning is too speculative and cannot be recovered. Owners' contention was that the stay at New Orleans caused increased bottom cleaning and drydocking expenses over and above what the vessel would have experienced had it been trading during that period of time. Although I am convinced that a ship deteriorates rapidly when not in service, the assumptions and calculations offered by Higgins were far too speculative to be able to award damages.

The bunkers and lube oil claim by owners is excessive. The owners were entitled to 18 days fuel for steam-up conditions and another 197 days for non-steam conditions while the vessel was in port. Using owners' calculations, this adds up to a total of $43,977.61.

The last bond premium of $938 is also recoverable. The bond resulted from the difficulties arising out of the river trial casualty and is attributable to repairers. The total amount of general expenses recoverable is $143,837.35.

The recoverable out-of-pocket expenses are the sum

of the agent's accounts, surveyors expenses and general expenses. Owners can recover the sum of $276,052.53 from Todd in this category.

The total of LP repair damages, loss-of-use damages, and out-of-pocket expenses is $1,142,446.20. The balance due on the contract payment must be deducted from the damages as a "savings made possible." *Sturgeon Bay*, 247 F.Supp. at 292. This balance due is $174,813. Total damages due from Todd to owners is $967,633.20.

I have found that owners can recover costs and attorney's fees. The amount due under this category will be tried in due course.

TODD'S CLAIM AGAINST OWNERS

[97] Todd has invoiced the owners for services rendered after the river trial casualty. Owners have stipulated that $4,110 of those amounts are owed to Todd, and I find that they are recoverable under the counterclaim. I find that all of the rest of the expenses Todd has attempted to charge the owners under this claim were expenses attributable to the negligence or breaches of obligations of Todd or its subcontractors and are not recoverable. The expenditures for those work items would not have been necessary in the normal course of events but for the faulty conduct of repairers and owners cannot be charged for it on Todd's counterclaim. The total owed Todd by owners is $4,110.

TODD'S CLAIM AGAINST TURBINE SERVICE AND TRAVELERS

[98] Turbine Service breached its contract with Todd to repair the LP turbine and must pay damages to Todd sufficient to have that contract completed according to its terms minus the amount remaining unpaid by Todd under the contract.[37] I have found the contract-completion amount to be $221,393.76. Todd still owes Turbine Service $125,818.75. The total due Todd by Turbine Service for breach of the LP repair contract is $95,575.01.

[99] Counsel for Travelers has pointed out that the Contractual Liability Endorsement of its policy to Turbine Service does not include liability under a warranty of workmanlike performance. I find that this excludes liability for breach of obligation of diligent performance. However, under the Comprehensive General Liability Form, Travelers must pay all damages because of property damage excluding property damage to Turbine Service's products arising out of such products.[38] I find that the policy does not cover the cost of replacing blades in rows 11-14 and 63 other blades from miscellaneous rows at a cost of $51,323. I find that none of the exclusions relieves Travelers from paying the remainder of the LP repair damages. *Pittsburgh Bridge & Iron Works v. Liberty Mutual Insurance Co.*, 444 F.2d 1286 (3rd Cir. 1971);

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[37] See fn. 31 *supra* and text accompanying it.

[38] See "Exclusions (l) and (m)" of Comprehensive General Liability Form.

Cotton States Insurance Co. v. Diamond Housing Mobile Homes, 430 F.Supp. 503, 507 (N.D.Ala.1977). Todd is entitled to recovery of $44,252.01 from Travelers, that amount being the total due Todd by Turbine Service to repair the LP turbine less the amount excludable under the policy.

GONZALES' CROSS-CLAIM AGAINST TURBINE SERVICE

I have found that Gonzales did not breach its contract with Turbine Service because the WWP had been extinguished by the release. Gonzales is thus due the balance owed them from Turbine Service of $50,065.

SIEMENS' CLAIM AGAINST TODD

[100] Todd requested the attendance of Siemens personnel after the river trial casualty. I find that these services were for the benefit of Todd. Accordingly, Todd is liable to Siemens for the amount of $12,838.01. Although I have considered the matter, I have not included this amount in the damages recoverable by Todd by way of indemnity.

TODD'S INDEMNITY DAMAGES

I have found above that Todd is entitled to indemnity from Turbine Service and Gonzales. The losses occasioned by the breaches of obligations of diligent and workman-

like performance of Turbine Service and Gonzales are added as follows:

Todd owes owners	$ 967,633.20
Todd's expenses for vessel maintenance May 1975 Feb. 1976	99,647.00
Sub-Total	$1,067,280.20
Owed by Turbine Service and Travelers for LP restoration	-95,575.01
Total	$ 971,705.19

Todd is entitled to recovery of one-half of this total from each of the two other repairers.

The insurers of Turbine Service and Gonzales each claim that exclusions in their policies relieve them from liability. The exclusions in each case are so similar that analysis of one suffices for both.

[101] I find that no exclusion of the policies of Travelers or Sentry relieves them from liability for the above expenditures and that they must indemnify Todd in equal parts. I have given particular care and attention to the exclusions for "loss of use of tangible property which has not been physically injured or destroyed..." and the exclusion sometimes known as the "sister ship exclusion." They do not apply in this case.

RECAPITULATION

The following is a summary of the damages awarded:

Owners owe Todd		$ 4,110.00
Todd owes owners		
Repair of LP		221,393.76
Loss of use		645,000.00
Expenses		276,052.53
		1,142,446.20
Less balance owed		174,813.00
TOTAL		$ 967,633.20
Turbine Service owes Todd		
Repair of LP		221,393.76
Less balance owed		125,818.75
Sub-total		95,575.01
Less insurance		44,252.01
TOTAL		$ 51,323.00
Travelers owes Todd		
Repair of LP		44,252.01
Indemnity		485,852.60
TOTAL		$ 530,104.61
Turbine Service owes Gonzales		$ 50,065.00
Sentry owes Todd		$ 485,852.60
Todd owes Siemens		$ 12,838.01

Counsel for plaintiff will prepare judgment accordingly.

APPENDIX

DRAMATIS PERSONAE

ADAMS, Sr., John—Principal member of Turbine Service opening and closing vessel's LP and HP turbines.

AULT, Gordon—Ship's superintendent for Todd Shipyards in charge of KATRIN job.

BERGERON, Alvin—Assistant General Manager of Todd.

COLEMAN, JR., Walker—Contract administrator for Todd.

DISTELHUT, Heinz—Siemens' technician called to New Orleans May 29 to June 6, 1975 to consult on river trial damage.

FRITZSCHE, Harald—Group supervisor in the technical service department of the Siemens Turbine Factory at Wessel, West Germany, who was consulted by telephone after the river trial casualty as to proper repairs and subsequently became involved in the actual repairs at Wessel.

HARRISON, Peter—A private consulting marine engineer hired by London Salvage Association in July, 1976 to attend the KATRIN at Cork to make a survey on their behalf.

HARVEY, Keith—A London Salvage Association staff surveyor stationed in New Orleans in 1975 attending the KATRIN during the repairs at Todd to process and negotiate a claim made by owners on underwriters for alleged crew negligence of January 31, 1975. First involved on February 19, 1975, attended survey of damages on February 26, 1975. Met with Van Rynbach and Coleman on or about May 16 to set final prices for repairs. Accomplished and actively participated in the July 21, 1975 survey after the river trial casualty.

HERRIN, Royal—Machinist working for Gonzales in 1975, took dimensions of LP casings and manufactured spacer rings.

HIGGINS, Frank—An independent marine consulting engineer and ship surveyor from Liverpool, England operating his own firm known as Akti Marine. Commissioned by shipowners to attend the vessel in New Orleans after the river trial casualty in order to survey the damage and make recommendations to owners. Later he was also commissioned to consult in Wessel, Germany with personnel from Siemens A.G. during the repairs carried out there on the LP turbine. He also was in charge of the reinstallation of the LP turbine and other matters involving the vessel after it was removed from Todd Shipyards in early 1976. Finally, he attended the vessel after the Cork casualty, surveyed the damage and consulted with owners as to the vessel's condition at that time.

HOFFROGGE, Theodor—Siemens' employee involved with commercial transactions and pricing after the river trial casualty up through ultimate scrapping of the vessel.

HOOVER, Ronald—Presently President of Gonzales, formerly contact man with Sheridan of Turbine Service for KATRIN job and supervisor of work done on KATRIN parts by Gonzales.

KOREN, William—Customer liaison man for Todd, carried papers and messages between Manellis and certain Todd departments and personnel, serving as chauffeur, messenger and general helper to ship's personnel during the KATRIN's docking at Todd.

KOULOURIS, Paul—Diana Shipping Agencies' accountant managing the books pertaining to the KATRIN during the pertinent period.

KUGLER, Arthur—Expert witness on welding, welding engineering and professional engineering, mechanical engineer, teacher and author.

MANELLIS, Emmanuil—Technical Director of Diana Shipping Agencies, present in New Orleans with the vessel until March 7, 1975, owners' representative and port engineer during that period of time.

McPHATE, Andrew—Professor of Mechanical Engineering at Louisiana State University, hired as an independent consultant by Turbine Service on May 30, 1975 to view portions of the LP turbine and to make a report concerning the damage.

MEGHRIAN, John—General Manager, Todd Shipyards Corp., New Orleans.

MUELLER, Capt. Karl—Employed by Hansen and Tidemann, local agents for the vessel KATRIN from May 8, 1975 to February 1976.

MUSSACHIA, SR., Joseph—Todd's representative on the vessel during the river trial, primary witness concerning river trial casualty.

O'BRIEN, Allen—Marine surveyor and consultant called on by owners to view the vessel's turbines in January/February 1976, aided Higgins in unsuccessful attempts to find a New Orleans shipyard to reinstall LP turbine after its rebuilding in Germany.

OLSEN, III, Olaf—Marine surveyor for Olaf H. Olsen and Son, Inc., assigned as New Orleans surveyors for Germanischer Lloyd in Hamburg, a German classification society, responsible for classification society functions while the KATRIN was at Todd in 1975.

O'NEAL, Noel—General superintendent of Todd, Ault's supervisor, a participant in the decision to heat the LP casing.

PALIOS, Simos—President, director and shareholder of Auto Transportation, S.A., president and director of Diana Shipping Agencies, ultimate decision-maker with regard to repairs of vessel in 1975-76.

ROEMER, Rudolf—Expert witness on marine engineering operating as Mobile Marine Associates, alternate surveyor for Lloyd's Registry in Mobile, Alabama.

RICHTER, Wolfgang—Rotor blade fitter for Siemens, Wessel, West Germany; in New Orleans for 5 days after the river trial casualty.

SAENZ, JR., I. J.—Machinist working for Gonzales at the time of the repairs, cut and machined new replacement airfoils and old roots to prepare them for welding.

SAINT, JR., James (Dale)—Gonzales welder who chose rod for welding blade pieces, welded sample blades, welded about one-half of the LP fabricated blades.

SHERIDAN, Jon—Turbine Service supervisor of KATRIN repair job, supervisor of steam turbine department, main contact with both Gonzales and Todd.

TRIPOLITIS, Constantin—Captain of the KATRIN from April 1 to May 14, 1975 and from February 21, 1976 to February 8, 1977, captain of the vessel during the Cork casualty.

TSAKNARIS, Stylianos—Chief Engineer and owners' representative for the KATRIN repairs from March 25 to May 24, 1975, present during a major portion of the repair period at Todd.

VAN RYNBACH, Jan—Independent marine surveyor hired by owners to go to New Orleans and to survey damage and ascertain the cause, primarily for purposes of preparing a claim against underwriters. Prepared survey in late February, 1975 of original damage and came to agreement on repair work accomplished and prices with Coleman and Harvey on second trip to New Orleans in May 1975 before river trial casualty.

WARNKROSS, Dieter—Siemens engineer in the erection and installation department, sent to New Orleans in January, 1976 to help Higgins on the reinstallation of the LP turbine, also attended vessel after Cork casualty.

WITTER, Henry—Employee of Owensby and Kritikos, conducted pull tests on ten LP rotor blades after river trial casualty, commissioned by Turbine Service.

WOODS, Charles—Vice President and half-owner of Turbine Service until April 1976; Sheridan's immediate supervisor.

ORGANIZATIONS

Germanischer Lloyd, Hamburg—German Classification Society, similar to Veritas, American Bureau of Shipping or Lloyds Register, maintains standards of classification ships and surveys vessels registered with it to determine what class they are to be awarded; in this case, the classification society for the vessel KATRIN.

Fritz Maritime—Owners' agents in New Orleans before Hansen and Tidemann.

Hansen and Tidemann, Inc.—Steamship agents in New Orleans, owners' agents from May 8, 1975 to February 1976.

London Salvage Association—Clearing house established by London underwriters to act in their behalf on technical matters. It is a non-profit association of Lloyds underwriters.

Owensby and Kritikos—Engineering testing company.

Diana Shipping Agencies, Inc.—A Greek management company, managing 15 vessels, including the KATRIN during the relevant period.

Lloyd's Register of Shipping—A classification society which carries out surveys to maintain or ascertain the

condition of a vessel, establishes certain classes of vessels for insurance purposes and assigns classification ratings to particular vessels.